

List of Acronyms and Abbreviations

1-D	one-dimensional
2-D	two-dimensional
3-D	three-dimensional
AAS	American Astronomical Society
AEC	Atomic Energy Commission
AEDC	Arnold Engineering Development Center
AFPL	Air Force Phillips Laboratory
AFRL	Air Force Research Laboratory
AFWL	Air Force Weapons Laboratory
AGT	aboveground test
AGU	American Geophysical Union
AIRAPT	International Association of High Pressure Science and Technology
AIAA	American Institute of Aeronautics and Astronautics
ALE	arbitrary Lagrangian-Eulerian
ALEGRA	Arbitrary Lagrangian Eulerian General Research Applications
ANEOS	analytic equation of state
ANFO	ammonium nitrate and fuel oil
APS	American Physical Society
ARA	Aeroballistic Range Association
ARL	Army Research Laboratory
ASCI	Accelerated Strategic Computing Initiative
AT&T	American Telephone and Telegraph
AWE	Atomic Weapons Establishment
BBAY	Bethe, Bade, Averell, Yos
BKW	Becker–Kistiakowsky–Wilson
BN	Bechtel Nevada (corporation)
B-N	Baer–Nunziato
BRACIS	beam reflection at center of impact surface
BRL	Ballistic Research Laboratory
CDAR	Coupled Damage And Reaction

CDC	Control Data Corporation
CHARTD	Coupled Hydrodynamics and Radiation Transport Diffusion
CINT	Center for Integrated Nanotechnologies
CJ	Chapman-Jouguet
CLP	Corporate Lethality Program
CSQ	CHARTD Squared
CTBT	Comprehensive Test Ban Treaty
CTH	CSQ to the Three Halves
DAC	diamond anvil cell
DASA	Defense Atomic Support Agency
DARPA	Defense Advanced Research Projects Agency
DDT	deflagration-to-detonation transition
DFT	density functional theory
DICE	Dynamic Integrated Compression Experimental
DMTS	Distinguished Member of Technical Staff
DNA	Defense Nuclear Agency
DOD	Department of Defense
DOE	Department of Energy
DTRA	Defense Threat Reduction Agency
EBW	exploding bridgewire
EEGS	Electrical Energy Gun System
ECF	Explosive Components Facility
EHVL	enhanced hypervelocity launcher
EOS	equation of state
ERDA	Energy Research and Development Administration
ES&H	Environment, Safety, and Health
FE	ferroelectric
FEM	ferroelectric model
GM	General Motors
GRL	Geophysical Research Letters
GRC	General Research Corporation
HARP	Hazards Assessment of Rocket Propellants
HE	high explosive
HEDP	high energy density physics
HEL	Hugoniot elastic limit
HNX	hexanitrostilbene explosive
HPC	high performance computing
HST	Hubble Space Telescope
HVIS	Hypervelocity Impact Symposium
HVL	HyperVelocity Launcher
IBM	International Business Machines
ICBM	intercontinental ballistic missile
ICE	isentropic compression experiment
ICF	inertial confinement fusion
IIT	Illinois Institute of Technology

ISL	Institut de Recherches de Saint-Louis
ISP	Institute of Shock Physics
ISS	International Space Station
IUTAM	International Union of Theoretical and Applied Mechanics
IVA	inductive voltage adder
JASPER	Joint Actinide Shock Physics Experimental Research
JCZ	Jacobs-Cowperthwaite-Zwisler
JANAF	Joint Army Navy Air Force (sometimes written as JANNAF to include NASA)
JMP	Joint Munitions Program
JSC	Johnson Space Center
JWL	Jones–Wilkins–Lee
KFK	Kernforschungszentrum Karlsruhe (Karlsruhe Institute of Technology)
LANL	Los Alamos National Laboratory
LDRD	Laboratory Directed Research and Development
LEO	low-Earth orbit
LIHE	light initiated high explosive
LMD	Lee-More-Desjarlais
LLNL	Lawrence Livermore National Laboratory
LTD	linear transformer driver
M&S	modeling and simulation
MAD	mutually assured destruction
MAPS	magnetically applied pressure shear
MAVEN	Model Accreditation via Experimental Sciences for Nuclear Weapons
MBBAY	Modified BBAY
MD	molecular dynamics
MDA	Missile Defense Agency
MF	magnetic flyer
MHD	magnetohydrodynamic
MIT	Massachusetts Institute of Technology
MITL	magnetically insulated transmission line
MOU	memorandum of understanding
MP	melting point
MPP	massively parallel processing
MSFC	Marshall Space Flight Center
NAE	National Academy of Engineering
NASA	National Aeronautics and Space Administration
NIF	National Ignition Facility
NIST	National Institute of Standards and Technology
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
NSWC	Naval Surface Weapons Center
NTS	Nevada Test Site
NRL	Naval Research Laboratory
ODE	ordinary differential equation

OMA	Optical Multichannel Analyzer
ORVIS	Optically Recorded Velocity Interferometer System
OSD	Office of the Secretary of Defense
P- α	Pressure- α (model)
P- λ	Pressure- λ (model)
PBFA II	Particle Beam Fusion Accelerator II
PBX	polymer-bonded explosive
PCTH	Parallel CTH
PDF	probability density function
PDV	photon Doppler velocimetry
PETN	pentaerythritol tetranitrate
PIC	particle in cell
PMMA	polymethyl methacrylate
PG	powder gun
PPG	Pacific Proving Ground
PVDF	polyvinylidene difluoride
PZT	Pb (lead) zirconate titanate
QMD	quantum molecular dynamics
R&D	research and development
RG	railgun
RHALE	Robust Hydrodynamics Arbitrary Lagrangian Eulerian
RPI	Rensselaer Polytechnic Institute
R-T	Rayleigh-Taylor
SCCM	Shock Compression of Condensed Matter
SCE	subcritical experiment
SDI	Strategic Defense Initiative
SDIO	Strategic Defense Initiative Organization
SITI	Sandia Instrumented Thermal Initiation
SL9	Shoemaker–Levy 9 comet
SLIFER	Shorted Location Indicator by Frequency of Electrical Resonance
SNL	Sandia National Laboratories
SNM	special nuclear material
SPH	smooth particle hydrodynamics
SPR	Strategic Petroleum Reserve
SRI	Stanford Research Institute
SSP	Stockpile Stewardship Program
STAR	Shock Thermodynamics Applied Research
STScI	Space Telescope Science Institute
SWAP	Stress Wave Application Program
TARDEC	Tank Automotive Research, Development, and Engineering Center
TATB	triaminotrinitrobenzene
TBF	Terminal Ballistics Facility
THAAD	Theater High-Altitude Area Defense
TOE	third-order elastic
TMD	Theater Missile Defense
TMI	Three Mile Island

TIM	transient insertion mechanism
TP	triple point
TSG	Two-Stage light gas Gun
TTBT	Threshold Test Ban Treaty
UGT	underground nuclear test
UK	United Kingdom
U.S.	United States
VASP	Vienna Ab initio Simulation Package
VISAR	Velocity Interferometer System for Any Reflector
VSIP	Volunteer Staff Incentive Program
V&V	verification and validation
WDM	warm dense matter
WIPP	Waste Isolation Pilot Plant
WSU	Washington State University
XDT	explosive detonation transition
XRD	x-ray diode
YAG laser	neodymium-doped yttrium aluminum garnet ($\text{Nd:Y}_3\text{Al}_5\text{O}_{12}$) laser
Z	Z pulsed power facility
ZND	Zeldovich–von Neumann–Doring

Bibliography

Editors' Note Because of the extent of our bibliography, which contains nearly 1000 entries, it is somewhat unique in the following respects, as summarized below.

- The order of the entries in the bibliography is alphabetical by the first author chronologically by year. Entries in the same year for that same first author with one coauthor come next in the bibliography—that is, author 1 and author 2 (year). This is followed by entries in the same year for that same first author with multiple coauthors, *regardless of the alphabetical ordering of those coauthors*, using the customary a, b, and c notation for that specific year if there is more than one reference for that same first author with two or more coauthors—for example, author 1, author 2, and author 3 (year a); author 1, author 2, author 3 (year b); and author 1, author 2, author 3 et al. (year c).
- Our bibliography does contain some references by first authors that have the same last name but that are distinctly different individuals. An example of this occurs on the first page of our bibliography: entry in our bibliography and M. U. Anderson is the first author of the fifth entry in our bibliography. Another example is the four distinct first-author Browns (J. L. Brown, P. G. Brown, W. K. Brown, and W. T. Brown). Because of this, in the text of Part I and Part II of our book, you will find instances where three or four authors are listed, followed by the year—for example, (author 1, author 2, author 3, year) rather than our usual (author 1 et al., year).

- T. Akashi, A.B. Sawaoka, R.A. Graham, The effect of shock compression on graphite-like boron nitride, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 821–826
- C.S. Alexander, L.C. Chhabildas, W.D. Reinhart, D.W. Templeton, Changes to the shock response of fused quartz due to glass modification. *Int. J. Impact Eng.* **35**, 1376–1384 (2008)
- C.S. Alexander, J.R. Asay, T.A. Haill, Magnetically applied pressure-shear: A new method for direct measurement of strength at high pressure. *J. Appl. Phys.* **108**, 126101 (2010)
- C.E. Anderson, T.G. Trucano, S.A. Mullin, Debris cloud dynamics. *Int. J. Impact Eng.* **9**(1), 89–113 (1990)
- M.U. Anderson, R.A. Graham, D.E. Wackerbarth, Prediction and data analysis of current pulses from impact-loaded piezoelectric polymers (PVDF), in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, J.N. Johnson, L.W. Davison (Elsevier, Amsterdam, 1990), pp. 805–808
- M.U. Anderson, L.C. Chhabildas, W.D. Reinhart, Simultaneous PVDF/VISAR measurement technique for isentropic loading with graded density impactors, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, D.P. Dandekar, J.W. Forbes. AIP Conference Proceedings, vol. 429 (AIP, College Park, MD, 1998), pp. 841–844
- M.U. Anderson, D.E. Cox, S.T. Montgomery, R.E. Setchell, Compositional effects on the shock compression and release properties of alumina-filled epoxy, in *Shock Compression of Condensed Matter*, ed. by M. Elert, M.D. Furnish, R. Chau, N. Holmes, J. Nguyen. AIP Conference Proceedings, vol. 825 (AIP, College Park, MD, 2006), pp. 789–792
- J.A. Ang, Impact flash jet initiation phenomenology. *Int. J. Impact Eng.* **10**, 23–33 (1990)
- J.A. Ang, G. Hauze, Impact of acceleration on barrel/launch package design. *IEEE Trans. Magnetics* **27**, 544–549 (1991)
- J.A. Ang, L.C. Chhabildas, B.G. Cour-Palais, E.L. Christiansen, J.L. Crews, Evaluation of Whipple bumper shields at 7 and 10 km/s. AIAA Paper No. 92–1590 (1991)
- J.A. Ang, A hypervelocity impact jet formation, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, R.D. Dick, J.W. Forbes, D.G. Tasker (Elsevier, Amsterdam, 1992), pp. 1019–1022
- J.A. Ang, C.H. Konrad, C.A. Hall, A.R. Susoeff, R.S. Hawke, G.L. Sauve, A.R. Vasey, S.M. Gosling, R.J. Hickman, Hypervelocity projectile design and fabrication. *IEEE Transactions on Magnetics* **29**(1), 722–727 (1993a)
- J.A. Ang, B.D. Hansche, C.H. Konrad, W.C. Sweatt, S.M. Gosling, R.J. Hickman, Pulsed holography for hypervelocity impact diagnostics. *Int. J. Impact Eng.* **14**, 13–24 (1993b)
- J.A. Ang, B.D. Hansche, Pulsed holography diagnostics of impact fragmentation, in *High-Pressure Shock Compression of Solids II: Dynamic Fracture and Fragmentation*, ed. by L.W. Davison, D.E. Grady, M. Shahinpoor (Springer, New York, NY, 1996), pp. 176–193
- T. Ao, J.R. Asay, J.-P. Davis, M.D. Knudson, C.A. Hall, High-pressure quasi-isentropic loading and unloading of interferometer windows on the Veloce pulsed power generator, in *Shock Compression of Condensed Matter*, ed. by M. Elert, M.D. Furnish, R. Chau, N.C. Holmes, J. Nguyen. AIP Conference Proceedings, vol. 955 (AIP, College Park, MD, 2007), pp. 1157–1160
- T. Ao, J.R. Asay, S. Chantrenne, M.R. Baer, C.A. Hall, A compact strip-line pulsed power generator for isentropic compression experiments. *Rev. Sci. Instrum.* **79**, 013903 (2008)
- T. Ao, M.D. Knudson, J.R. Asay, J.P. Davis, Strength of lithium fluoride under shockless compression to 114 GPa. *J. Appl. Phys.* **106**, 103507 (2009a)
- T. Ao, R.J. Hickman, S.L. Payne, W.M. Trott, Line-imaging ORVIS measurements of interferometric windows under quasi-isentropic compression, in *Shock Compression of Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, M.D. Furnish, W.W. Anderson, W.G. Proud. AIP Conference Proceedings, vol. 1195 (AIP, College Park, MD, 2009b), pp. 619–622
- J.R. Asay, G.R. Fowles, G.E. Duvall, M.H. Miles, R.F. Tinder, Effects of point defects on elastic precursor decay in LiF. *J. Appl. Phys.* **45**(5), 2132–2145 (1972)
- J.R. Asay, Shock-induced melting in bismuth. *J. Appl. Phys.* **45**, 4441–4452 (1974)

- J.R. Asay, L.M. Barker, Interferometric measurement of shock-induced internal particle velocity and spatial variations in particle velocity. *J. Appl. Phys.* **45**(6), 2540–2546 (1974)
- J.R. Asay, D.B. Hayes, Shock-compression and release behavior near melt states in aluminum. *J. Appl. Phys.* **46**, 4789–4800 (1975)
- J.R. Asay, D. Hicks, D. Holdridge, Comparison of experimental and calculated elastic-plastic wave profiles in LiF. *J. Appl. Phys.* **46**, 4316–4322 (1975)
- J.R. Asay, L.P. Mix, F.C. Perry, Ejection of material from shocked surfaces. *J. Appl. Phys.* **29**, 284–287 (1976)
- J.R. Asay, Shock loading and unloading in bismuth. *J. Appl. Phys.* **48**, 2832–2844 (1977a)
- J.R. Asay, Effects of shock wave risetime on material ejection from aluminum surfaces, SAND77-0731 (Sandia National Laboratories, Albuquerque, NM, 1977b)
- J.R. Asay, Thick-plate technique for measuring ejecta from shocked surfaces. *J. Appl. Phys.* **49**, 6173–6175 (1978)
- J.R. Asay, L.D. Bertholf, A model for estimating the effects of surface roughness on mass ejection from shocked surfaces, SAND78-1256 (Sandia National Laboratories, Albuquerque, NM, 1978)
- J.R. Asay, J. Lipkin, A self-consistent technique for estimating the dynamic strength of a shock-loaded material. *J. Appl. Phys.* **49**, 4242–4247 (1978)
- J. Asay, B. Butcher, C. Konrad, Internal pressure measurements on the Sandia powder gun, SAND79-2178 (Sandia National Laboratories, Albuquerque, NM, 1978)
- J.R. Asay, L.C. Chhabildas, Some new developments in shock wave research, in *High Pressure Science and Technology – 1979*, (Proceedings of the VIIth International AIRAPT Conferences Part II), ed. by B. Vodar, P. Marteau (AIP, College Park, MD, 1980), pp. 958–964
- J.R. Asay, L.C. Chhabildas, Determination of the shear strength of shock-compressed 6061-T6 aluminum, in *Shock waves and high-strain-rate phenomena in metals*, ed. by M.A. Myers, L.E. Murr (Plenum, New York, NY, 1981), pp. 417–424
- J.R. Asay, L.C. Chhabildas, J.L. Wise, Strain rate effects in beryllium under shock compression, in *Shock Waves in Condensed Matter*, ed. by W.J. Nellis, L. Seaman, R.A. Graham. AIP Conference Proceedings, vol. 78 (AIP, College Park, MD, 1982a), pp. 427–431
- J.R. Asay, L.C. Chhabildas, J.L. Wise, Viscoplastic response of beryllium under shock compression, in *High Pressure in Research and Industry – 8th AIRAPT and 19th EHPRG Conference Proceedings*, ed. by C.M. Backman, T. Johannisson, L. Tegnér (Arkitektkopia, Uppsala, 1982b), pp. 227–230
- J.R. Asay, L.C. Chhabildas, G.I. Kerley, T.G. Trucano, High pressure strength of shocked aluminum, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 145–150
- J.R. Asay, G.I. Kerley, The response of materials to dynamic loading. *Int. J. Impact Eng.* **5**, 69–99 (1987)
- J.R. Asay, T.G. Trucano, L.C. Chhabildas, Time-resolved measurements of shock-induced vapor-pressure profiles, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 159–162
- J.R. Asay, T.G. Trucano, Experimental measurements of shock-induced vaporization in cadmium and lead, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, J.N. Johnson, L.W. Davison (Elsevier, Amsterdam, 1990), pp. 143–146
- J.R. Asay, T.G. Trucano, R. Hawke, The use of hypervelocity launchers to explore previously inaccessible states of matter. *Int. J. Impact Eng.* **10**, 51–66 (1990)
- J.R. Asay, C.A. Hall, C.H. Konrad, W.M. Trott, G.A. Chandler, K.J. Fleming, K.G. Holland, L.C. Chhabildas, T.A. Mehlhorn, R. Vesey, T.G. Trucano, A. Hauer, R. Cauble, M. Foord, Use of z-pinch sources for high-pressure equation-of-state studies. *Int. J. Impact Eng.* **23**, 27–38 (1999)
- J.R. Asay, Isentropic compression experiments on the Z accelerator, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson. AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 261–266

- J.R. Asay, C.A. Hall, K.G. Holland, M.A. Bernard, W.A. Stygar, R.B. Spielman, S.E. Rosenthal, D.H. McDaniel, D.B. Hayes, Isentropic compression of iron with the Z accelerator, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson. AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 1151–1154
- J.R. Asay, M.D. Knudson, Use of pulsed magnetic fields for quasi-isentropic compression experiments, in *High Pressure Shock Compression of Solids VIII*, ed. by L.C. Chhabildas, L.W. Davison, Y. Horie (Springer, New York, NY, 2005), pp. 329–380
- J.R. Asay, T. Ao, J.-P. Davis, C.A. Hall, T.J. Vogler, G.T. Gray, Effect of initial properties on the flow strength of aluminum during quasi-isentropic compression. *J. Appl. Phys.* **103**, 083514 (2008)
- J.R. Asay, T. Ao, T.J. Vogler, J.-P. Davis, G.T. Gray, Yield strength of tantalum for shockless compression to 18 GPa. *J. Appl. Phys.* **106**, 073515 (2009)
- J.R. Asay, T.J. Vogler, T. Ao, J. Ding, Dynamic yielding of single crystal Ta at strain rates of $\sim 5 \times 10^5/s$. *J. Appl. Phys.* **109**, 073507 (2011)
- S. Attaway, S. Haniff, J. Stevenson, J. Wilke, Cielo CCC-1 summary: Lightweight, blast resistant structure development, SAND2011-6477P (Sandia National Laboratories, Albuquerque, NM, 2011)
- M.R. Baer, J.W. Nunziato, A theory for deflagration-to-detonation transition (DDT) in granular explosives, SAND82-0293 (Sandia National Laboratories, Albuquerque, NM, 1983)
- M.R. Baer, J.W. Nunziato, A Two-Phase Mixture Theory for the Deflagration-to-Detonation Transition (DDT) in Reactive Granular Materials. *Int. J. Multiphase Flow* **12**(6), 861–889 (1986)
- M.R. Baer, R.J. Gross, J.W. Nunziato, E.A. Igel, An experimental and theoretical study of deflagration-to-detonation transition (DDT) in the granular explosive CP. *Combust Flame* **65**, 15–30 (1986)
- M.R. Baer, Numerical studies of dynamic compaction of inert and energetic granular materials. *J. Appl. Mech.* **55**, 36–43 (1988)
- M.R. Baer, J.W. Nunziato, Compressive combustion of granular materials induced by low velocity impact, in *Proceedings of the 9th International Detonation Symposium Office of Naval Research Report ONR 113291-7:293-305*, ed. by J.M. Short, E.L. Lee (Office of Naval Research, San Diego, CA, 1989)
- M.R. Baer, A mixture model for shock compression of porous multi-component reactive mixtures, in *High-Pressure Science and Technology*, ed. by S.C. Schmidt, J.W. Shaner, G.A. Samara, M. Ross. AIP Conference Proceedings, vol. 309 (AIP, College Park, MD, 1994), pp. 1247–1250
- M.R. Baer, P.W. Cooper, M.E. Kipp, Investigations of emergency destruction methods for recovered, explosively configured, chemical warfare munitions: Interim emergency destruction methods—Evaluation report, SAND95-8248 (Sandia National Laboratories, Albuquerque, NM, 1995)
- M.R. Baer, Continuum mixture modeling of reactive porous media (Chapter 3), in *High-Pressure Shock Compression of Solids IV: Response of Highly Porous Solids to Shock Loading*, ed. by L. Davison, Y. Horie, M. Shahinpoor (Springer, New York, NY, 1996)
- M.R. Baer, E.S. Hertel Jr., R.L. Bell, Multidimensional DDT modeling of energetic materials, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, W.C. Tao. AIP Conference Proceedings, vol. 370 (AIP, College Park, MD, 1996a), pp. 433–436
- M.R. Baer, R.A. Graham, M.U. Anderson, S.A. Sheffield, R.L. Gustavsen, Experimental and theoretical investigations of shock-induced flow of reactive porous media, in *Proceedings of the 1996 JANAF Combustion Subcommittee and Propulsion System Hazards Subcommittee Joint Meeting* (Chemical Propulsion Information Analysis Center, Johns Hopkins University, Baltimore, MD, 1996b), pp. 123–132
- M.R. Baer, Shock wave structure in heterogeneous reactive media, in *Proceedings of 21st International Symposium on Shock Waves* (University of Queensland, Great Keppel Island, 1997), pp. 923–927

- M.R. Baer, M.E. Kipp, F. van Swol, Micromechanical modeling of heterogeneous energetic materials, in *Proceedings of the 11th International Detonation Symposium*, ONR 33300-5, ed. by J.M. Short, J.E. Kennedy (Office of Naval Research, Washington, D.C., 1998), pp. 788–797
- M.R. Baer, Computational modeling of heterogeneous reactive materials at the mesoscale, in *Shock Compression of Condensed Matter*, ed. by M. Furnish, L. Chhabildas, R. Hixson. AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 27–33
- M.R. Baer, W.M. Trott, Mesoscale descriptions of shock-loaded heterogeneous porous materials, in *Shock Compression of Condensed Matter*, ed. by M. Furnish, N.N. Thadhani, Y. Horie. AIP Conference Proceedings, vol. 620 (AIP, College Park, MD, 2002a), pp. 713–716
- M.R. Baer, W.M. Trott, Theoretical and experimental mesoscale studies of impact-loaded granular explosives and simulants materials, in *Proceedings of the 12th International Detonation Symposium, San Diego, CA*, ONR 333-05-2, ed. by J.M. Short, J.L. Maienschein (Office of Naval Research, Washington, D.C., 2002b), pp. 939–950
- M.R. Baer, W.M. Trott, Mesoscale studies of shock loaded tin sphere lattices, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, Y.M. Gupta, J.W. Forbes. AIP Conference Proceedings, vol. 706 (AIP, College Park, MD, 2004), pp. 517–520
- J.E. Bailey, J. Asay, M. Bernard, A.L. Carlson, G.A. Chandler, C.A. Hall, D. Hanson, R. Johnston, P. Lake, J. Lawrence, Optical spectroscopy measurements of shock waves driven by intense z-pinch radiation. *J. Quant. Spectrosc. Rad. Transfer* **65**, 31–42 (2000)
- J.E. Bailey, M.D. Knudson, A.L. Carlson, G.S. Dunham, M.P. Desjarlais, D.L. Hanson, J.R. Asay, Time-resolved optical spectroscopy measurements of shocked liquid deuterium. *Phys. Rev. B* **78**, 144107 (2008)
- L.M. Barker, Measurement of free surface motion by the slanted resistor technology, SC-DR-610078 (Sandia National Laboratories, Albuquerque, NM, 1961)
- L.M. Barker, Determination of shock wave and particle velocities from slanted resistor data, SC004611 (RR) (Sandia National Laboratories, Albuquerque, NM, 1962)
- L.M. Barker, R.E. Hollenbach, System for measuring the dynamic properties of materials. *Rev. Sci. Instrum.* **35**, 742–746 (1964)
- L.M. Barker, C.D. Lundergan, W. Herrmann, Dynamic response of aluminum. *J. Appl. Phys.* **35**(4), 1203–1212 (1964)
- L.M. Barker, R.E. Hollenbach, Interferometer technique for measuring the dynamic mechanical properties of materials. *Rev. Sci. Instrum.* **36**(11), 1617–1620 (1965)
- L.M. Barker, B.M. Butcher, C.H. Karnes, Yield point phenomenon in impact-loaded 1060 aluminum. *J. Appl. Phys.* **37**(5), 1989–1991 (1966)
- L.M. Barker, Fine structure of compressive and release wave shapes in aluminum measured by the velocity interferometer technique, in *Behavior of Dense Media Under High Dynamic Pressures* (Proceedings of IUTAM Symposium), ed. by J. Berger (Gordon and Breach, New York, NY, 1968), pp. 483–504
- L.M. Barker, R.E. Hollenbach, Shock wave studies of PMMA, fused silica, and sapphire. *J. Appl. Phys.* **41**(10), 4208–4226 (1970)
- L.M. Barker, Velocity interferometer data reduction. *Rev. Sci. Instrum.* **42**(2), 276–278 (1971a)
- L.M. Barker, A model for stress wave propagation in composite materials. *J. Compos. Mater.* **5**(2), 140–162 (1971b)
- L.M. Barker, R.E. Hollenbach, A laser interferometer for measuring high velocities of any reflecting surface. *J. Appl. Phys.* **43**(11), 4669–4675 (1972)
- L.M. Barker, VISAR data reduction, SLA-73-1038 (Sandia National Laboratories, Albuquerque, NM, 1974)
- L.M. Barker, R.E. Hollenbach, Shock wave study of the α - ϵ phase transition in iron. *J. Appl. Phys.* **45**(11), 4872–4887 (1974)
- L.M. Barker, K.W. Schuler, Correction to the velocity-per-fringe relationship for the VISAR interferometer. *J. Appl. Phys.* **45**(8), 3692–3693 (1974)
- L.M. Barker, E.G. Young, SWAP-9: An improved stress wave analyzing program, SLA-74-0009 (Sandia National Laboratories, Albuquerque, NM, 1974) [This version supersedes an earlier report by Barker dated 1969]

- L.M. Barker, P.J. Chen, W.A. Sebrell, Determination of the conditions of spallation in an impulsively loaded quartz phenolic-beryllium composite ring, SLA-74-0245 (Sandia National Laboratories, Albuquerque, NM, 1974a)
- L.M. Barker, C.D. Lundergan, P.J. Chen, M.E. Gurtin, Nonlinear viscoelasticity and the evolution of stress waves in laminated composites: a comparison of theory and experiment. *J. Appl. Mech.* **41**, 1025–1030 (1974b)
- L.M. Barker, α -phase Hugoniot of iron. *J. Appl. Phys.* **46**(6), 2544–2547 (1975)
- L.M. Barker, High-pressure quasi-isentropic impact experiments, in *Shock Compression of Condensed Matter*, ed. by J.R. Asay, R.A. Graham, G.K. Straub (Elsevier, Amsterdam, 1984), pp. 217–223
- L.M. Barker, T.G. Trucano, J.L. Wise, J.R. Asay, Experimental technique for measuring the isentrope of hydrogen to several megabars, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 455–459
- L.M. Barker, T.G. Trucano, J.W. Munford, Metal surface gouging by hypervelocity sliding contact, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 753–756
- L.M. Barker, T.G. Trucano, A.R. Susoeff, Railgun rail gouging by hypervelocity sliding contact. *IEEE Trans. Magnet* **25**(1), 83–87 (1989)
- L.M. Barker, L.C. Chhabildas, Gas-accelerated plate stability study, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, J.N. Johnson, L.W. Davison (Elsevier, Amsterdam, 1990), pp. 989–991
- L.M. Barker, L.C. Chhabildas, T.G. Trucano, J.R. Asay, High gas pressure acceleration of flyer plates: Experimental techniques. *Int. J. Impact Eng.* **10**, 67–80 (1990)
- L.M. Barker, The development of the VISAR, and its use in shock compression science, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson. AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000a), pp. 11–17
- L.M. Barker, Multi-beam VISARs for simultaneous velocity vs. time measurements, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson. AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000b), pp. 999–1002
- N.R. Barton, J.V. Bernier, R. Becker, A. Arsenlis, R. Cavallo, J. Marian, M. Rhee, H.-S. Park, B.A. Remington, R.T. Olson, A multiscale strength model for extreme loading conditions. *J. Appl. Phys.* **109**, 073501 (2011)
- R.C. Bass, B.C. Benjamin, H.M. Miller, D.R. Breeding, SLIFER measurement for explosive yield, SAND76-0007 (Sandia National Laboratories, Albuquerque, NM, 1976)
- F. Bauer, R.A. Graham, M.U. Anderson, H. Lefebvre, L.M. Lee, R.P. Reed, Response of the piezoelectric polymer PVDF to shock compression greater than 10 GPa, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, R.D. Dick, J.W. Forbes, D.G. Tasker (Elsevier, Amsterdam, 1992), pp. 887–890
- K. Baumung, J. Singer, S.V. Razorenov, A.V. Utkin, Hydrodynamic proton beam-target interaction experiments using an improved line-imaging velocimeter, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, W.C. Tao. AIP Conference Proceedings, vol. 370 (AIP, College Park, MD, 1996), pp. 1015–1018
- R. Becker, Effects of crystal plasticity on materials loaded at high pressures and strain rates. *Int. J. Plas.* **20**, 1983–2006 (2004)
- L.A. Behrmann, G. Dunbar, W. Wesloh, L.W. Davison, Reverse engineering of shaped charges, in *5th International Symposium on Ballistics* (Societe des Amis de l'ENSAE et de l'ENSTA Service Technique des Poudres et Explosifs, Toulouse, 1980), pp. 1–6
- W.B. Benedick, Air guns and the use of air propelled projectiles. Sandia National Laboratories Technical Memorandum SCTM560079-51 (Sandia National Laboratories, Albuquerque, NM, 1956)
- W.B. Benedick, Nitroguanidine explosive plane-wave generator for producing low amplitude shock waves. *Rev. Sci. Instrum.* **36**(9), 1309–1315 (1965)
- W.B. Benedick, J.D. Kennedy, B. Morosin, Detonation limits of unconfined hydrocarbon-air mixtures. *Combust. Flame* **15**, 83–84 (1970)

- W.B. Benedick, Detonation wave shaping, in *Behavior and Utilization of Explosives in Engineering Design* (Proceedings 12th Annual Symposium New Mexico Section of the American Society of Mechanical Engineers), ed. by L.W. Davison, J. Kennedy, F. Coffey (NM Section ASME, Albuquerque, NM, 1972), pp. 47–56
- R.A. Benham, Light-initiated explosive for impulse measurements on structural members, SAND75-0516 (Sandia National Laboratories, Albuquerque, NM, 1976)
- L.D. Bertholf, L.D. Buxton, B.J. Thorne, R.K. Byers, A.L. Stevens, S.L. Thompson, Damage in steel plates from hypervelocity impact. II. Numerical results and spall measurement. *J. Appl. Phys.* **46**, 3776–3783 (1975)
- L.D. Bertholf, M.E. Kipp, Two-dimensional stress wave calculations of kinetic energy projectile impact on multi-layered targets, SAND76-9247 (Sandia National Laboratories, Albuquerque, NM, 1977)
- G.C. Bessette, R.J. Lawrence, L.C. Chhabildas, W.D. Reinhart, T.F. Thornhill, W.V. Saul, Multi-dimensional hydrocode analysis of penetrating hypervelocity impacts, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, Y.M. Gupta, J.W. Forbes. AIP Conference Proceedings, vol. 706 (AIP, College Park, MD, 2004), pp. 1323–1326
- D.D. Bloomquist, S.A. Sheffield, Optically recording interferometer for velocity measurements with subnanosecond resolution. *J. Appl. Phys.* **54**, 1717–1722 (1983a)
- D.D. Bloomquist, S.A. Sheffield, ORVIS, optically recording velocity interferometer system theory of operation and data reduction techniques, SAND82-2918 (Sandia National Laboratories, Albuquerque, NM, 1983b)
- R.R. Boade, M.E. Kipp, D.E. Grady, A blasting concept for preparing vertical modified in situ oil shale retorts, SAND81-1255 (Sandia National Laboratories, Albuquerque, NM, 1981)
- P.B. Bochev, C.J. Garasi, J.J. Hu, A.C. Robinson, R.S. Tuminaro, An improved algebraic multigrid method for solving Maxwell's equations. *SIAM J. Sci. Comp.* **25**(2), 623–642 (2003a)
- P.B. Bochev, J.J. Hu, A.C. Robinson, R.S. Tuminaro, Towards robust 3D z-pinch simulations: Discretization and fast solvers for magnetic diffusion in heterogeneous conductors. *Electron Trans. Num. Anal.* **15**, 186–210 (2003b)
- J.P. Borg, T.J. Vogler, Mesoscale calculations of the dynamic behavior of a granular ceramic. *Int. J. Solids Struct.* **45**, 1676–1696 (2008)
- J.P. Borg, T.J. Vogler, Aspects of simulating the dynamic compaction of a granular ceramic. *Model Simul. Mater. Sci. Eng.* **17**, 045003 (2009a)
- J.P. Borg, T.J. Vogler, The effect of water content on the shock compaction of sand, in *DYMAT 2009 – 9th International Conferences on the Mechanical and Physical Behavior of Materials under Dynamic Loading*, ed. by S. Hiermaier (EDP Sciences, Brussels, 2009b), pp. 1545–1552
- J.P. Borg, T.J. Vogler, A. Fraser, A review of mesoscale simulations of granular materials, in *Shock Compression of Condensed Matter*, ed. by M.L. Elbert, W.T. Buttler, M.D. Furnish, W.W. Anderson, W.G. Proud. AIP Conference Proceedings, vol. 1195 (AIP, College Park, MD, 2009), pp. 1331–1334
- J.P. Borg, T.J. Vogler, Rapid compaction of granular material: characterizing two- and three-dimensional mesoscale simulations. *Shock Waves* **23**, 153–176 (2013)
- M.B. Boslough, R.A. Graham, Submicrosecond shock-induced chemical reactions in solids: First real-time observations. *Chem. Phys. Lett.* **121**, 446–452 (1985)
- M.B. Boslough, E.L. Venturini, B. Morosin, R.A. Graham, D.L. Williamson, Physical properties of shocked and thermally altered nontronite: Implications for the Martian surface. *J. Geophys. Res.* **91**, E207–E214 (1986a)
- M.B. Boslough, R.A. Graham, D.M. Webb, Optical measurements of shock-induced chemical reactions in mixed aluminum-nickel powder, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986b), pp. 767–772
- M.B. Boslough, Shock-induced chemical reactions in nickel-aluminum powder mixtures: Radiation pyrometer measurements. *Chem. Phys. Lett.* **160**, 618–622 (1989)

- M.B. Boslough, Shock modification and chemistry and planetary geologic processes. *Annual Rev. Earth Planet Sci.* **19**, 101–130 (1991)
- M.B. Boslough, Thermochemistry of shock-induced exothermic reactions in selected porous mixtures, in *Proceedings of Explomet 1990 International Conference on Shock-Wave and High-Strain-Rate Phenomena in Materials*, ed. by M.A. Meyers, L.E. Murr, K.P. Staudhammer (Marcel Dekker, New York, NY, 1992), pp. 253–260
- M.B. Boslough, J.R. Asay, Basic principles of shock compression (Chapter 2), in *High-Pressure Shock Compression of Solids*, ed. by J.R. Asay, M. Shahinpoor (Springer, New York, NY, 1993), pp. 7–42
- M.B. Boslough, J.A. Ang, L.C. Chhabildas, W.D. Reinhart, C.A. Hall, B.G. Cour-Palais, E.L. Christiansen, J.L. Crews, Hypervelocity testing of advanced shielding concepts for spacecraft against impacts to 10 km/s. *Int. J. Impact Eng.* **14**, 95–106 (1993)
- M.B. Boslough, L.C. Chhabildas, W.D. Reinhart, C.A. Hall, J.M. Miller, R. Hickman, S.A. Mullin, D.L. Littlefield, PVDF gauge characterization of hypervelocity—Impact-generated debris clouds, in *High-Pressure Science and Technology*, ed. by S.C. Schmidt, J.W. Shaner, G.A. Samara, M. Ross. AIP Conference Proceedings, vol. 309 (AIP, College Park, MD, 1994a), pp. 1833–1836
- M.B. Boslough, D.A. Crawford, A.C. Robinson, T.G. Trucano, Watching for fireballs on Jupiter. *Eos Trans. Am Geophys. Union* **27**, 305–310 (1994b)
- M. Boslough, E. Chael, T.G. Trucano, D.A. Crawford, Axial focusing of energy from a hypervelocity impact on Earth. *Int. J. Impact. Eng.* **17**, 99–108 (1995a)
- M.B. Boslough, D.A. Crawford, T.G. Trucano, A.C. Robinson, Numerical modeling of Shoemaker-Levy 9 impacts as a framework for interpreting observations. *Geophys. Res. Lett.* **22**(13), 1821–1824 (1995b)
- M.B. Boslough, D.A. Crawford, Impact-generated atmospheric plumes: observations on Jupiter and implications for Earth, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, W.C. Tao. AIP Conference Proceedings, vol. 370 (AIP, College Park, MD, 1996), pp. 1187–1190
- M.B. Boslough, D.A. Crawford, Shoemaker-Levy 9 and plume forming collisions on Earth near-Earth objects, in *Annals of the New York Academy of Sciences*, ed. by J.L. Remo, vol. 822 (The New York Academy of Sciences, New York, NY, 1997), pp. 236–282
- M.B. Boslough, D.A. Crawford, Low-altitude airbursts and the impact threat. *Int. J. Impact. Eng.* **35**, 1441–1448 (2008)
- R.M. Bowen, P.J. Chen, Acceleration waves in chemically reacting ideal fluid mixtures. *Arch. Ration. Mech. Anal.* **47**, 171–187 (1972a)
- R.M. Bowen, P.J. Chen, Acceleration waves in anisotropic thermoelastic materials with internal state variables. *Acta Mech.* **15**, 95–104 (1972b)
- R.M. Bowen, P.J. Chen, J.W. Nunziato, Shock waves in a mixture of chemically reacting materials with memory. *Acta Mech.* **21**, 1–11 (1975)
- R.M. Brannon, L.C. Chhabildas, Experimental and numerical investigation of shock-induced full vaporization of zinc. *Int. J. Impact Eng.* **17**, 109–120 (1995)
- R.M. Brannon, S.T. Montgomery, J.B. Aidun, A.C. Robinson, Macro- and meso-scale modeling of PZT ferroelectric ceramics, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, N.N. Thadhani, Y.M. Horie. AIP Conference Proceedings, vol. 620 (AIP, College Park, MD, 2002), pp. 197–200
- N.S. Brar, Z. Rosenberg, S.J. Bless, Applying Steinberg's model to the Hugoniot elastic limit of porous boron carbide specimens, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, R.D. Dick, J.W. Forbes (Elsevier, Amsterdam, 1992), pp. 467–470
- J.L. Brown, G. Ravichandran, W.D. Reinhart, W.M. Trott, High-pressure Hugoniot measurements using converging shocks. *J. Appl. Phys.* **109**, 093520 (2011)
- J.L. Brown, C.S. Alexander, J.R. Asay, T.J. Vogler, J.L. Ding, Extracting strength from high pressure ramp-release experiments. *J. Appl. Phys.* **114**, 223518 (2013)
- J.L. Brown, C.S. Alexander, J.R. Asay, T.J. Vogler, D.H. Dolan, J.L. Belof, Flow strength of tantalum under ramp compression to 250 GPa. *J. Appl. Phys.* **115**, 043530 (2014a)

- J.L. Brown, M.D. Knudson, C.S. Alexander, J.R. Asay, Shockless compression and release behavior of beryllium to 110 GPa. *J. Appl. Phys.* **116**, 033502 (2014b)
- P.G. Brown, J.D. Assink, L. Astiz et al., A 500-kiloton airburst over Chelyabinsk and an enhanced hazard from small impactors. *Nature* **503**, 238–241 (2013)
- W.K. Brown, R.R. Karpp, D.E. Grady, Fragmentation of the universe. *Astrophys. Space Sci.* **94**, 401–412 (1983)
- W.T. Brown, P.J. Chen, On the nature of the electric field and the resulting voltage in axially loaded ferroelectric ceramics. *J. Appl. Phys.* **49**(6), 3446–3450 (1978)
- T.A. Brunner, Forms of approximate radiation transport, in *Nuclear Mathematical and Computational Sciences: A Century in Review, a Century Anew* (American Nuclear Society, La Grange Park, IL, 2003)
- T.A. Brunner, C.J. Garasi, T.A. Hail, T.A. Mehlhorn, K. Cochrane, A.C. Robinson, R.M. Summers, ALEGRA-HEDP: Version 46, SAND2005-5996 (Sandia National Laboratories, Albuquerque, NM, 2005)
- K.G. Budge, J.S. Peery, RHALE: A MMALE shock physics code written in C++. *Int. J. Impact Eng.* **14**, 107–120 (1993)
- K.G. Budge, Verification of the radiation package in ALEGRA, SAND99-0786 (Sandia National Laboratories, Albuquerque, NM, 1999)
- B.M. Butcher, L.M. Barker, D.E. Munson, C.D. Lundergan, Influence of stress history on time-dependent spall in metals. *AIAA J.* **2**, 977–990 (1964)
- B.M. Butcher, J.R. Cannon, Influence of work-hardening on the dynamic stress strain curves of 4340 steel. *AIAA J.* **2**, 2174–2179 (1964)
- B.M. Butcher, D.E. Munson, Influence of mechanical properties on wave propagation in elastic-plastic materials, in *Proceedings of the 4th International Detonation Symposium*, ONR ACR-126, ed. by S.J. Jacobs, D. Price (U.S. Naval Ordnance Laboratory, Silver Spring, MD, 1965)
- B.M. Butcher, Computer program SRATE for the study of strain-rate sensitive stress wave propagation—Part I, SC-RR-650298 (Sandia National Laboratories, Albuquerque, NM, 1966)
- B.M. Butcher, C.H. Karnes, Strain rate effects in metals. *J. Appl. Phys.* **37**, 402–411 (1966)
- B.M. Butcher, Spallation in 4340 steel. *J. Appl. Mech. Ser. E* **89**(1), 209–210 (1967)
- B.M. Butcher, D.E. Munson, The application of dislocation dynamics to impact-induced deformation under uniaxial strain, in *Dislocation Dynamics*, ed. by A.R. Rosenfield, G.T. Hahn, A.L. Bement, R.J. Jaffe (McGraw Hill, New York, NY, 1967), pp. 591–607
- B.M. Butcher, Spallation in 6061-T6 aluminum, in *Behavior of Dense Media under High Dynamic Pressures* (Proceedings of IUTAM Symposium), ed. by J. Berger (Gordon and Breach, New York, NY, 1968), pp. 245–250
- B.M. Butcher, C.H. Karnes, Dynamic compaction of porous iron. *J. Appl. Phys.* **40**(7), 2967–2976 (1969)
- B.M. Butcher, The description of strain-rate effects in shocked porous materials, in *Shock Waves and the Mechanical Properties of Solids*, ed. by J.J. Burke, V. Weiss (Syracuse University Press, Syracuse, NY, 1971), pp. 227–243
- B.M. Butcher, Dynamic response of partially compacted porous aluminum during unloading. *J. Appl. Phys.* **44**, 4576–4582 (1973)
- B.M. Butcher, L.A. Kent, L.M. Lee, A method for measuring unloading paths in partially compacted strain-rate insensitive porous materials, SLA-73-0152 (Sandia National Laboratories, Albuquerque, NM, 1973)
- B.M. Butcher, M.M. Carroll, A.C. Holt, Shock wave compaction of porous aluminum. *J. Appl. Phys.* **45**, 3864–3875 (1974)
- B.M. Butcher, A.L. Stevens, The shock wave response of Window Rock coal. *Int. J. Rock Mech. Mining Sci. & Geomech. Abstr.* **12**, 147–155 (1975)
- R.K. Byers, A.J. Chabai, Penetration calculations and measurements for a layered soil target. *Int. J. Num. Anal. Meth. Geomech.* **1**, 107–138 (1977)
- R.K. Byers, P. Yarrington, A.J. Chabai, Dynamic penetration of soil media by slender projectiles, in *International Journal of Engineering Science: Penetration Mechanics (Special Issue)*, ed. by A.C. Eringen, vol. 16 (Pergamon, Oxford, 1978), pp. 835–844

- M.J. Carr, R.A. Graham, The effect of shock pressure and temperature on the deformation microstructure of rutile, in *Metallurgical Applications of Shock-Wave and High-Strain-Rate Phenomena*, ed. by L.E. Murr, K.P. Staudhammer, M. Meyers (Marcel Dekker, New York, NY, 1986), pp. 369–384
- M.J. Carr, C.R. Hills, R.A. Graham, J.L. Wise, The effects of microstructure on the substructure evolution and mechanical properties of shock-loaded 6061-T6 aluminum and JBK-75 stainless steel, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 335–338
- D. Carroll, E. Hertel, T.G. Trucano, Simulation of armor penetration by tungsten rods: ALEGRA validation report, SAND97-2765 (Sandia National Laboratories, Albuquerque, NM, 1997)
- W.H. Casey, M.J. Carr, R.A. Graham, Crystal defects and the dissolution kinetics of shocked rutile, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 331–334
- A.J. Chabai, Crater scaling laws for desert alluvium, SC-4391 (RR) (Sandia National Laboratories, Albuquerque, NM, 1959)
- A.J. Chabai, D.M. Hankins, Gravity scaling laws for explosion craters, SC-4541 (RR) (Sandia National Laboratories, Albuquerque, NM, 1960)
- A.J. Chabai, On scaling dimensions of craters produced by buried explosions. *J. Geophys. Res.* **70**, 5075–5098 (1965)
- A.J. Chabai, R.J. Lawrence, E.G. Young, Elastic-plastic target deformation due to a high speed pulsed water jet impact, SLA-74-5227 (Sandia National Laboratories, Albuquerque, NM, 1974)
- A.J. Chabai, C.W. Young, P. Yarrington, W.J. Patterson, R.K. Byers, Terradynamic technology – theory and experiment, in *Recent Advances in Engineering Science*, ed. by G.C. Sih (Lehigh University Publication, Bethlehem, PA, 1977), pp. 67–80
- A.R. Champion, W.B. Benedick, Detection of strong shock waves with plastic tapes. *Rev. Sci. Instrum.* **39**(3), 377–378 (1968)
- A.R. Champion, R.W. Rohde, Hugoniot equation of state and the effect of shock stress amplitude and duration on the hardness of Hadfield steel. *J. Appl. Phys.* **41**(5), 2213–2223 (1970)
- S. Chantrenne, J.L. Wise, J.R. Asay, M.E. Kipp, C.A. Hall, Design of a sample recovery assembly for magnetic ramp-wave loading, in *Shock Compression of Condensed Matter*, ed. by M.L. Elbert, W.T. Buttler, M.D. Furnish, W.W. Anderson, W.G. Proud, AIP Conference Proceedings, vol. 1195 (AIP, College Park, MD, 2009), pp. 695–698
- P.J. Chen, Growth of acceleration waves in isotropic elastic materials. *J. Acoust. Soc. Am.* **43**(5), 982–987 (1968a)
- P.J. Chen, Thermodynamic influences on the propagation and the growth of acceleration waves in elastic materials. *Arch. Ration. Mech. Anal.* **31**(3), 228–254 (1968b)
- P.J. Chen, M.E. Gurtin, E.K. Walsh, Shock amplitude variation in polymethyl methacrylate for fixed values of the strain gradient. *J. Appl. Phys.* **41**(8), 3557–3558 (1970)
- P.J. Chen, The growth of one-dimensional shock waves in elastic nonconductors. *Int. J. Solids Struct.* **7**, 5–10 (1971)
- P.J. Chen, M.E. Gurtin, Growth and decay of one-dimensional shock waves in fluids with internal state variables. *Phys. Fluids* **14**(6), 1091–1094 (1971)
- P.J. Chen, M.E. Gurtin, On the use of experimental results concerning steady shock waves to predict the acceleration wave response of nonlinear viscoelastic materials. *J. Appl. Mech.* **39**(1), 295–296 (1972)
- P.J. Chen, R.A. Graham, L.W. Davison, Analysis of unsteady waves in solids. *J. Appl. Phys.* **43**(12), 5021–5027 (1972)
- P.J. Chen, Growth and decay of waves in solids, in *Handbuch der Physik*, Band **VIa** (3), ed. by S. Flugge (Springer, Berlin, 1973), pp. 303–402
- P.J. Chen, J.W. Nunziato, On wave propagation in perfectly heat conducting inextensible elastic. *J. Elast.* **5**, 155–160 (1975)

- P.J. Chen, J.E. Kennedy, Chemical kinetic and curvature effects on shock-wave evolution in shocked explosives, in *Proceedings of the 6th International Detonation Symposium*, ONR ACR-221, ed. by S.J. Jacobs, D.J. Edwards (Office of Naval Research, Washington, D.C., 1976), pp. 379–388
- P.J. Chen, P.C. Lysne, H.J. Sutherland, Electrical responses of ferroelectric ceramics to dynamic loads of uniaxial strain, in *Propagation of Shock Waves in Solids* (The American Society of Mechanical Engineers, New York, NY, 1976a), pp. 73–78
- P.J. Chen, L.W. Davison, M.F. McCarthy, Electrical responses of nonlinear piezoelectric materials to plane waves of uniaxial strain. *J. Appl. Phys.* **47**(11), 4759–4764 (1976b)
- P.J. Chen, S.T. Montgomery, Normal mode responses of linear piezoelectric materials with hexagonal symmetry. *Int. J. Solids Struct.* **13**, 947–955 (1977)
- P.J. Chen, S.T. Montgomery, Boundary effects on the normal-mode responses of linear transversely isotropic piezoelectric materials. *J. Appl. Phys.* **49**(2), 900–904 (1978)
- P.J. Chen, M.F. McCarthy, T.R. O'Leary, One-dimensional shock and acceleration waves in deformable dielectric materials with memory. *Arch. Ration. Mech. Anal.* **62**(2), 189–207 (1978)
- P.J. Chen, S.T. Montgomery, A macroscopic theory for the existence of the hysteresis and butterfly loops in ferroelectricity. *Ferroelectrics* **23**(1), 199–207 (1980)
- P.J. Chen, T.J. Tucker, One dimensional polar mechanical and dielectric responses of the ferroelectric ceramic PZT 65/35 due to domain switching. *Int. J. Eng. Sci.* **19**, 147–158 (1981)
- L.C. Chhabildas, H.M. Gilder, Thermal coefficient of expansion of an activated vacancy in zinc from high pressure self-diffusion experiments. *Phys. Rev. B* **5**, 2135–2144 (1972)
- L.C. Chhabildas, A.L. Ruoff, The transition of sulfur to a conducting phase. *J. Chem. Phys.* **66**(3), 983–985 (1977)
- L.C. Chhabildas, J.R. Asay, Rise-time measurements of shock transitions in aluminum, copper, steel. *J. Appl. Phys.* **50**(4), 2749–2756 (1979)
- L.C. Chhabildas, H.J. Sutherland, J.R. Asay, A velocity interferometer technique to determine shear-wave particle velocity in shock-loaded solids. *J. Appl. Phys.* **50**(8), 5196–5201 (1979)
- L.C. Chhabildas, J.W. Swegle, Dynamic pressure-shear loading of materials using anisotropic crystals. *J. Appl. Phys.* **51**(9), 4799–4807 (1980)
- L.C. Chhabildas, J.R. Asay, Time-resolved wave profile measurements in copper to megabar pressures, in *High Pressure in Research and Industry* (Proceedings of 6th AIRAPT and 19th EHPRG International Conference), ed. by C.-M. Backman, T. Johannisson, L. Tegnér (Arkitektkopia, Uppsala, 1982), pp. 183–189
- L.C. Chhabildas, R.D. Hardy, Pressure-shear loading techniques for material-property studies, SAND82-1546 (Sandia National Laboratories, Albuquerque, NM, 1982)
- L.C. Chhabildas, J.W. Swegle, On the dynamical response of particulate-loaded materials I. Pressure-shear loading of alumina particles in an epoxy matrix. *J. Appl. Phys.* **53**(2), 954–956 (1982)
- L.C. Chhabildas, J.L. Wise, J.R. Asay, Reshock and release behavior of beryllium, in *1981 Topical Conference on Shock Waves in Condensed Matter*, ed. by W.J. Nellis, L. Seaman, R.A. Graham. AIP Conference Proceedings, vol. 78 (AIP, College Park, MD, 1982), pp. 422–426
- L.C. Chhabildas, Dynamic transverse particle velocity measurements using interferometric techniques, in *Proceedings of the SPIE*, vol. 427 (International Society for Optics and Photonics, Bellingham, WA, 1983), pp. 136–143
- L.C. Chhabildas, D.E. Grady, Dynamic material response of quartz at high strain rates, in *High Pressure Science and Technology*, (Proceedings of the 9th AIRAPT International High Pressure Conference), vol 3, ed. by C. Homan, R.K. MacCrone, E. Whalley (AIRAPT, Albany, NY, 1984), pp. 147–150

- L.C. Chhabildas, M.E. Kipp, Pressure-shear loading of PBX-9404, in *Proceedings of the 8th International Detonation Symposium*, NSWC MP 86-194, ed. by J.M. Short, W.E. Deal (Naval Surface Warfare Center, Dahlgren, VA, 1985), pp. 274–283
- L.C. Chhabildas, J.M. Miller, Release-adiabat measurements in crystalline quartz, SAND85-1092 (Sandia National Laboratories, Albuquerque, NM, 1985)
- L.C. Chhabildas, L.M. Barker, Dynamic quasi-isentropic compression of tungsten, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 111–114
- L.C. Chhabildas, J.R. Asay, L.M. Barker, Shear strength of tungsten under shock- and quasi-isentropic loading to 250 GPa, SAND88-0306 (Sandia National Laboratories, Albuquerque, NM, 1988)
- L.C. Chhabildas, L.M. Barker, J.R. Asay, T.G. Trucano, Relationship of fragment size to normalized spall strength for materials. *Int. J. Impact Eng.* **10**, 107–124 (1990)
- L.C. Chhabildas, L.M. Barker, J.R. Asay, T.G. Trucano, G.I. Kerley, Sandia's new hypervelocity launcher, HVL, SAND91-0657 (Sandia National Laboratories, Albuquerque, NM, 1991)
- L.C. Chhabildas, J.R. Asay, Dynamic yield strength and spall strength measurements under quasi-isentropic loading, in *Shock-Wave and High-Strain-Rate Phenomena in Materials*, ed. by M.A. Meyers et al. (Marcel Dekker, New York, NY, 1992), pp. 947–955
- L.C. Chhabildas, L.M. Barker, J.R. Asay, T.G. Trucano, G.I. Kerley, J.E. Dunn, Launch capabilities to over 10 km/s, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, R.D. Dick, J.W. Forbes, D.G. Tasker (Elsevier, Amsterdam, 1992), pp. 1025–1031
- L.C. Chhabildas, E.S. Hertel, S.A. Hill, Hypervelocity impact tests and simulations of single Whipple bumper shield concepts at 10 km/s. *Int. J. Impact Eng.* **14**, 133–144 (1993a)
- L.C. Chhabildas, J.E. Dunn, W.D. Reinhart, J.M. Miller, An impact technique to accelerate flyer plates to velocities over 12 km/s. *Int. J. Impact Eng.* **14**, 121–132 (1993b)
- L.C. Chhabildas, T.G. Trucano, W.D. Reinhart, C.A. Hall, Chunk projectile launch using the Sandia hypervelocity launcher facility, SAND94-1273 (Sandia National Laboratories, Albuquerque, NM, 1994)
- L.C. Chhabildas, L.N. Kmetyk, W.D. Reinhart, C.A. Hall, Enhanced hypervelocity launcher: Capabilities to 16 km/s. *Int. J. Impact Eng.* **17**, 183–191 (1995)
- L.C. Chhabildas, M.D. Furnish, D.E. Grady, Impact of alumina rods – A computational and experimental study. *J. Phys. IV (Colloque)* **7(C3)**, 137–143 (1997)
- L.C. Chhabildas, M.D. Furnish, W.D. Reinhart, D.E. Grady, Impact of AD995 alumina rods, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, D.P. Dandekar, J.W. Forbes. AIP Conference Proceedings, vol. 429 (AIP, College Park, MD, 1998), pp. 505–508
- L.C. Chhabildas, W.D. Reinhart, Intermediate strain-rate loading experiments – technique and applications to ceramics, in *Proceedings of the 15th U.S. Army Symposium on Solid Mechanics*, ed. by S.C. Chou, K.S. Iyer (Battelle, Columbus, OH, 1999), pp. 233–240
- L.C. Chhabildas, M.D. Furnish, W.D. Reinhart, Shock induced melting in aluminum: Wave profile measurements, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson. AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000a), pp. 97–100
- L.C. Chhabildas, T.G. Trucano, R.M. Summers, W.D. Reinhart, J.S. Peery, D.A. Mosher, G.A. Mann, C.H. Konrad, M.E. Kipp, Experimental benchmark data for ALEGRA code validations, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson. AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000b), pp. 1011–1014
- L.C. Chhabildas, W.M. Trott, W.D. Reinhart, J.R. Cogar, G.A. Mann, Incipient spall studies in tantalum—Microstructural effects, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, N.N. Thadhani, Y. Horie. AIP Conference Proceedings, vol. 620 (AIP, College Park, MD, 2002), pp. 483–486
- L.C. Chhabildas, W.D. Reinhart, T.F. Thornhill, G.C. Bessette, W.V. Saul, R.J. Lawrence, M.E. Kipp, Hypervelocity impacts on aluminum from 6 to 11 km/s for hydrocode benchmarking, SAND2003-1235 (Sandia National Laboratories, Albuquerque, NM, 2003)

- L.C. Chhabildas, M.D. Knudson, Techniques to launch projectile plates to high velocities, in *High Pressure Shock Compression of Solids VIII*, ed. by L.C. Chhabildas, L.W. Davison, Y. Horie (Springer, New York, NY, 2005), pp. 143–200
- L.C. Chhabildas, W.D. Reinhart, T.F. Thornhill, J.L. Brown, Shock-induced vaporization in metals. *Int. J. Impact Eng.* **33**(1-12), 158–168 (2006)
- J. Clerouin, P. Renaudin, V. Recoules et al., Equation of state and electrical conductivity of strongly correlated aluminum and copper plasmas. *Contrib. Plasma Phys.* **43**(5-6), 269–272 (2003)
- J. Clerouin, P. Renaudin, Y. Laudernet et al., Electrical conductivity and equation of state study of warm dense copper: measurements and quantum molecular dynamics calculations. *Phys. Rev. B* **71**, 064203 (2005)
- K. Cochrane, M. Desjarlais, T. Haill, J. Lawrence, M. Knudson, G. Dunham, Aluminum equation of state validation and verification for the ALEGRA HEDP simulation code, SAND2006-1739 (Sandia National Laboratories, Albuquerque, NM, 2006)
- K. Cochrane, T.J. Vogler, M.P. Desjarlais, T.R. Mattsson, Density Functional Theory (DFT) simulations of porous tantalum pentoxide, in *18th American Physical Society Shock Compression in Condensed Matter and 24th International Association for the Advancement of High Pressure Science and Technology Conference. Journal of Physics Conference Series*, ed. by W. Buttler, M. Furlanetto, W. Evans, vol. 500 (IOP Publishing, Bristol, 2014), 032005
- G.W. Collins, L.B. Da Silva, P. Celliers, D.M. Gold et al., Measurements of the equation of state of deuterium at the fluid insulator-metal transition. *Science* **281**, 1178–1181 (1998)
- J. Comley, B.R. Maddox, R.E. Rudd et al., Strength of shock-loaded single-crystal tantalum [100] determined using *in situ* broadband x-ray Laue diffraction. *Phys. Rev. Lett.* **110**, 115501 (2013)
- M. Cooper, W. Trott, R. Schmitt, M. Short, S. Jackson, ANFO response to low-stress planar impacts, in *Shock Compression of Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, J.P. Borg, J.L. Jordan, T.J. Vogler. AIP Conference Proceedings, vol. 1426 (AIP, College Park, MD, 2012), pp. 595–598
- M.L. Corradini, D.S. Drumheller, Phenomenological Modelling of Steam Explosions, in *Proceedings of ANS/ENS Topical Meeting on Thermal Reactor Safety* (American Nuclear Society, La Grange Park, IL, 1980)
- D.A. Crawford, M. Boslough, T.G. Trucano, A.C. Robinson, The impact of comet Shoemaker – Levy 9 on Jupiter. *Shock Waves* **4**(1), 47–50 (1994)
- D.A. Crawford, M.B. Boslough, T.G. Trucano, A.C. Robinson, The impact of periodic comet Shoemaker-Levy 9 on Jupiter. *Int. J. Impact Eng.* **17**, 253–262 (1995)
- J.C. Crowhurst, M.R. Armstrong, B.K. Knight, J.M. Zaug, E.M. Behymer, Invariance of the dissipative action at ultrahigh strain rates above the strong shock threshold. *Phys. Rev. Lett.* **107**, 104322 (2011)
- R.T. Cygan, W.H. Casey, M.B. Boslough, H.R. Westrich, M.J. Carr, J.R. Holdren Jr., Dissolution kinetics of experimentally shocked silicate minerals. *Chem. Geol.* **78**, 229–244 (1989)
- R.T. Cygan, M.B. Boslough, R.J. Kirkpatrick, Experimentally shocked quartz, NMR spectroscopy and shock wave barometry, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt et al. (Elsevier, Amsterdam, 1990), pp. 653–656
- R.T. Cygan, M.B. Boslough, Analysis of experimentally shocked minerals by NMR spectroscopy, SAND94-0294 (Sandia National Laboratories, Albuquerque, NM, 1994)
- L.B. Da Silva, P. Celliers, G.W. Collins, K.S. Budil, N.C. Holmes et al., Absolute equation of state measurements on shocked liquid deuterium up to 200 GPa (2 Mbar). *Phys. Rev. Lett.* **78**, 483–486 (1997)
- D.M. Dattelbaum, S.A. Sheffield, D.B. Stahl, A.M. Dattelbaum, W.M. Trott, Influence of hot spot features in the initiation characteristics of heterogeneous nitromethane, in *Proceedings of the 14th International Symposium on Detonation*, ONR 351-10-185, ed. by S. Peiris, C. Boswell, B. Asay (Office of Naval Research, Washington, D.C., 2010), pp. 611–621
- J.-P. Davis, D.B. Hayes, J.R. Asay, P.W. Watts, P.A. Flores, D.B. Reisman, Investigation of liquid-solid phase transition using Isentropic Compression Experiments (ICE), in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, N.N. Thadhani, Y. Horie. AIP Conference Proceedings, vol. 620 (AIP, College Park, MD, 2002), pp. 221–224

- J.-P. Davis, User manual for INVICE 0.1-beta: A computer code for inverse analysis of isentropic compression experiments, SAND2005-2068 (Sandia National Laboratories, Albuquerque, NM, 2005)
- J.-P. Davis, S. Foiles, Experimental and computational study of the liquid–solid transition in tin, SAND2005-6522 (Sandia National Laboratories, Albuquerque, NM, 2005)
- J.-P. Davis, C. Deeney et al., Magnetically driven isentropic compression to multi-megabar pressures using shaped current pulses on the Z accelerator. *Phys. Plas.* **12**, 056310 (2005)
- J.-P. Davis, Experimental measurement of the principal isentrope for aluminum 6061-T6 to 240 GPa. *J. Appl. Phys.* **99**(10), 103512 (2006)
- J.-P. Davis, D.B. Hayes, Measurement of the dynamic β - γ phase boundary in tin, in *Shock Compression of Condensed Matter*, ed. by M. Elert, M.D. Furnish, R. Chau, N.C. Holmes, and J. Nguyen, AIP Conference Proceedings, vol. 955 (AIP, College Park, MD, 2007), pp. 159–162
- J.-P. Davis, CHARICE version 1.1 update, SAND2008-6035 (Sandia National Laboratories, Albuquerque, NM, 2008)
- L.W. Davison, Propagation of plane waves of finite amplitude in elastic solids. *J. Mech. Phys. Solids* **14**, 249–270 (1966)
- L.W. Davison, Perturbation theory of nonlinear elastic wave propagation. *Int. J. Solids Struct.* **4**, 301–322 (1968)
- L.W. Davison, J.N. Johnson, Elastoplastic wave propagation and spallation in beryllium: A review, SC-TM-70-634 (Sandia National Laboratories, Albuquerque, NM, 1970)
- L.W. Davison, Shock-wave structure in porous solids. *J. Appl. Phys.* **42**(13), 5503–5512 (1971)
- L.W. Davison, A.L. Stevens, Continuum measures of spall damage. *J. Appl. Phys.* **43**(3), 988–994 (1972)
- L.W. Davison, J. Kennedy, F. Coffey (eds.), *Behavior and Utilization of Explosives in Engineering Design* (Proceedings 12th Annual Symposium of New Mexico Section of the American Society of Mechanical Engineers, Albuquerque, NM, 1972)
- L.W. Davison, A.L. Stevens, Thermomechanical constitution of spalling elastic bodies. *J. Appl. Phys.* **44**(2), 668–674 (1973)
- L.W. Davison, Explosion containment devices: Design considerations, SAND74-0218 (Sandia National Laboratories, Albuquerque, NM, 1974)
- L.W. Davison, A.L. Stevens, M.E. Kipp, Theory of spall damage accumulation in ductile metals. *J. Mech. Phys. Solids* **25**, 11–28 (1977)
- L.W. Davison, M.E. Kipp, Calculation of spall accumulation in ductile materials, in *High Velocity Deformation of Solids*, ed. by K. Kawata, J. Shioiri (Springer-Verlag, Berlin, 1978), pp. 163–175
- L.W. Davison, R.A. Graham, Shock compression of solids. *Physics Reports* **55**(4), 255–359 (1979)
- L.W. Davison, Numerical modeling of dynamic material response, in *Shock Waves in Condensed Matter*, ed. by J.R. Asay, R.A. Graham, G.K. Straub (Elsevier, Amsterdam, 1984), pp. 181–186
- L.W. Davison, *Fundamentals of Shock Wave Propagation in Solids* (Springer, Berlin, 2008)
- M.P. Desjarlais, Practical improvements to the Lee-More conductivity near the metal-insulator transition. *Contrib. Plasma Phys.* **41**(2-3), 267–270 (2001)
- M.P. Desjarlais, J.D. Kress, L.A. Collins, Electrical conductivity for warm, dense aluminum plasmas and liquids. *Phys. Rev. E* **66**, 025401 (2002)
- M.P. Desjarlais, Density-functional calculations of the liquid deuterium Hugoniot, reshock, and reverberation timing. *Phys. Rev. B* **68**, 064204 (2003)
- A. Dewaele, P. Loubeyre, Mechanical properties of tantalum under high pressure. *Phys. Rev. B* **72**, 134106 (2005)
- J. Dietz, D.B. Hayes, Compilation of crater data, SC-RR-650220 (Sandia National Laboratories, Albuquerque, NM, 1965)
- G. Dimonte, D.L. Youngs, A. Dimits et al., A comparative study of the turbulent Rayleigh-Taylor instability using high-resolution three-dimensional numerical simulations: the Alpha-Group collaboration. *Phys. Fluids* **16**(5), 1668–1693 (2004)

- B.W. Dodson, M.B. Boslough, Techniques for recovery of shock-loaded samples, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, J.N. Johnson, L.W. Davison (Elsevier, Amsterdam, 1990), pp. 767–769
- D.W. Doerfler, M.B. Vigil, The Cielo petascale capability computer: Providing large-scale computing for stockpile stewardship. *Stockpile Stewardship Quarterly*, vol. 3 (2), pp. 3–5 (2013)
- D.H. Dolan, M.D. Knudson, C.A. Hall, C. Deeney, A metastable limit for compressed liquid water. *Nat. Phys.* **3**, 339–342 (2007)
- D.H. Dolan, T. Ao, Cubic zirconia as a dynamic compression window. *Appl. Phys. Lett.* **93**, 021908 (2008)
- D.H. Dolan, Accuracy and precision in photonic Doppler velocimetry (PDV). *Rev. Sci. Instrum.* **81**, 53905 (2010)
- D.H. Dolan, C.T. Seagle, T. Ao, Dynamic temperature measurements with embedded optical sensors, SAND2013-8203 (Sandia National Laboratories, Albuquerque, NM, 2013a)
- D.H. Dolan, R.W. Lemke, R.D. McBride, M.R. Martin, E. Harding et al., Tracking an imploding cylinder with photonic Doppler velocimetry. *Rev. Sci. Instrum.* **84**, 055102 (2013b)
- D.S. Drumheller, A. Bedford, On a continuum theory for a laminated medium. *J. Appl. Mech.* **40**, 527–532 (1973)
- D.S. Drumheller, C.D. Lundergan, On the behavior of stress waves in composite materials—Part II: Theoretical and experimental studies on the effects of constituent debonding. *Int. J. Solids Struct.* **11**, 75–87 (1975)
- D.S. Drumheller, The theoretical treatment of a porous solid using a mixture theory. *Int. J. Solids Struct.* **14**, 441–456 (1978)
- D.S. Drumheller, A. Bedford, On the mechanics and thermodynamics of fluid mixtures. *Arch. Rat. Mech. Anal.* **71**, 345–355 (1979)
- D.S. Drumheller, A theory for the shock-loaded response of an alumina-filled epoxy mixture, in *Shock Waves in Condensed Matter*, ed. by W.J. Nellis, L. Seaman, R.A. Graham. AIP Conference Proceedings, vol. 78 (AIP, College Park, MD, 1982a), pp. 527–528
- D.S. Drumheller, On the dynamical response of particulate-loaded materials: Part II – A theory with application to alumina particles in an epoxy matrix. *J. Appl. Phys.* **53**, 957–969 (1982b)
- D.S. Drumheller, TOM MIX: A computer code for calculating steam explosion phenomena, SAND81-2520 (Sandia National Laboratories, Albuquerque, NM, 1982c)
- D.S. Drumheller, M.E. Kipp, A. Bedford, Transient wave propagation in bubbly liquids. *J. Fluid Mech.* **119**, 347–365 (1982)
- D.S. Drumheller, Wavecode constitutive models: Nonhomogeneous mixtures, SAND84-0713 (Sandia National Laboratories, Albuquerque, NM, 1984)
- D.S. Drumheller, T.G. Trucano, L.C. Chhabildas, Wavecode constitutive models: Particulate-loaded composites, SAND84-0714 (Sandia National Laboratories, Albuquerque, NM, 1984)
- D.S. Drumheller, Hypervelocity impact of mixtures. *Int. J. Impact Eng.* **5**, 261–268 (1987)
- D.S. Drumheller, *Introduction to Wave Propagation in Nonlinear Fluids and Solids* (Cambridge University Press, New York, NY, 1998)
- G. Dunham, J.E. Bailey, A. Carlson, P. Lake, M.D. Knudson, Diagnostic methods for time-resolved optical spectroscopy of shocked liquid deuterium. *Rev. Sci. Instrum.* **75**, 928–935 (2004)
- J.E. Dunn, D.E. Grady, Strain rate dependence in steady plastic shock waves, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 359–364
- K.E. Duprey, R.J. Clifton, Pressure shear response of thin tantalum foils, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson. AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 447–450
- G.E. Duvall, R.A. Graham, Phase transitions under shock-wave loading. *Rev. Mod. Phys.* **49**(3), 523–579 (1977)
- J. Eggert, M. Bastea et al., Ramp wave stress-density measurements of Ta and W, in *Shock Compression of Condensed Matter*, ed. by M. Elert, M.D. Furnish, R. Chau, N.C. Holmes, J. Nguyen. AIP Conference Proceedings, vol. 955 (AIP, College Park, MD, 2007), pp. 1177–1180
- J.C. Eichelberger, D.B. Hayes, Magmatic model for the Mount St. Helens blast of May 18, 1980. *J. Geophys. Res.* **87**(B9), 7727–7738 (1982)

- P. Embid, M. Baer, Mathematical analysis of a two-phase continuum mixture theory. *Cont. Mech. Thermodynam.* **4**, 279–312 (1992)
- W.W. Erikson, E.S. Hertel Jr., M.J. Kaneshige, A.M. Renlund, A.C. Ratzel, Energetic materials research at Sandia National Laboratories, SAND2006-0806A (Sandia National Laboratories, Albuquerque, NM, 2006)
- A.V. Farnsworth Jr., W.M. Trott, R.E. Setchell, A computational study of laser driven flyer plates, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, N.N. Thadhani, Y. Horie. AIP Conference Proceedings, vol. 620 (AIP, College Park, MD, 2002), pp. 1355–1358
- G. Fenton, D.E. Grady, T.J. Vogler, Intense shock compression of porous solids: application to WC and Ta₂O₅, in *Shock Compression of Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, J.P. Borg, J.L. Jordan, T.J. Vogler. AIP Conference Proceedings, vol. 1426 (AIP, College Park, MD, 2012), pp. 1463–1466
- D.J. Fogelson, L.M. Lee, D.W. Gilbert, W.R. Conley, R.A. Graham, R.P. Reed, F. Bauer, Fabrication of standardized piezoelectric polymer shock gauges by the Bauer method, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 615–618
- J.W. Forbes, The history of the APS Shock compression of condensed matter Topical Group, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, N.N. Thadhani, Y. Horie. AIP Conference Proceedings, vol. 620 (AIP, College Park, MD, 2002), pp. 11–19
- J.W. Forbes, *Shock Wave Compression of Condensed Matter: A Primer* (Springer, Berlin, 2012)
- M.J. Forrestal, D.E. Grady, K.W. Schuler, An experimental method to estimate the dynamic fracture strength of oil shale in the 10³ to 10⁴/s strain rate regime. *Int. J. Rock Mech. Min. Sci.* **15**, 263–265 (1978)
- M.J. Forrestal, T.C. Togami, W.E. Baker, D.J. Frew, Performance evaluation of accelerometers used for penetration experiments. *Exp. Mech.* **43**(1), 90–96 (2003)
- G.R. Fowles, Shock wave compression of hardened and annealed 2024 aluminum. *J. Appl. Phys.* **32**, 1475–1487 (1961)
- A.M. Frank, W.M. Trott, Investigation of thin laser-driven flyer plates using streak imaging and stop motion microphotography, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, W.C. Tao. AIP Conference Proceedings, vol. 370 (AIP, College Park, MD, 1996), pp. 1209–1212
- D.E. Fratanduono, T.R. Boehly, M.A. Barrios, D.D. Meyerhofer, J.H. Eggert et al., Refractive index of lithium fluoride ramp compressed to 800 GPa. *J. Appl. Phys.* **109**, 123521 (2011)
- D.A. Fredenburg, T.J. Vogler, N.N. Thadhani, Meso-scale simulation of the shock compression response of equiaxed and needle morphology Al 6061-T6 powders, in *Shock Compression of Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, M.D. Furnish, W.W. Anderson, W.G. Proud. AIP Conference Proceedings, vol. 1195 (AIP, College Park, MD, 2009), pp. 1341–1344
- D.A. Fredenburg, N.N. Thadhani, T.J. Vogler, Shock consolidation of nano-crystalline 6061 aluminum. *Mater. Sci. Eng. A* **39**, 3349–3357 (2010)
- J.R. Freeman, J.M. McGlaun, E.C. Cnare, Numerical studies of helical CMF generators, in *Megagauss Physics and Technology*, ed. by P.J. Turchi (Plenum, New York, NY, 1980), pp. 205–218
- I.J. Fritz, R.A. Graham, Second-order elastic constants of high-purity vitreous silica. *J. Appl. Phys.* **45**(9), 4124–4125 (1974)
- N.S. Furman, *Sandia National Laboratories: The Postwar Decade* (University of New Mexico Press, Albuquerque, NM, 1990)
- M.D. Furnish, W.A. Bassett, Investigation of the mechanism of the olivine-spinel transition in fayalite by synchrotron radiation. *J. Geophys. Res. – Solid Earth* **88**(B12), 10333–10341 (1983)
- M.D. Furnish, J.M. Brown, Shock loading of single crystal olivine in the 100–200 GPa range. *J. Geophys. Res. – Solid Earth* **91**(B5), 4723–4729 (1986)
- M.D. Furnish, L.C. Chhabildas, Dynamic material properties of refractory materials – molybdenum, in *High strain rate behavior of refractory metals and alloys*, ed. by R. Asfahani, E. Chen, A. Crowson (The Minerals Metals & Materials Society, Warrendale, PA, 1992), pp. 229–240

- M.D. Furnish, Recent advances in methods for measuring the dynamic response of geological materials to 100 GPa. *Int. J. Impact Eng.* **14**, 267–277 (1993)
- M.D. Furnish, M.B. Boslough, G.T. Gray III, J.L. Remo, Dynamical properties measurements of asteroid, comet and meteorite material applicable to impact modeling and mitigation calculations. *Int. J. Impact Eng.* **17**, 341–352 (1995)
- M.D. Furnish, J.L. Remo, Ice issues, porosity, and snow experiments for dynamic NEO and comet modeling, in *Near-Earth Objects: United Nations International Conference*, vol. 822 (New York Academy Sciences, New York, NY, 1997), pp. 566–582
- M.D. Furnish, L.C. Chhabildas, W.D. Reinhart, Time-resolved particle velocity measurements at impact velocities of 10 km/s. *Int. J. Impact Eng.* **23**(1), 261–270 (1999)
- M.D. Furnish, L.C. Chhabildas, R.E. Setchell, S.T. Montgomery, Dynamic electromechanical characterization of axially poled PZT 95/5, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson. AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 975–978
- M.D. Furnish, J.-P. Davis, M. Knudson, T. Bergstresser, C. Deeney, J.R. Asay, Using the Saturn accelerator for isentropic compression experiments (ICE), SAND2001-3773 (Sandia National Laboratories, Albuquerque, NM, 2001a)
- M.D. Furnish, R.J. Lawrence, C.A. Hall, J.R. Asay, D.L. Barker, G.A. Mize, E.A. Marsh, M.A. Bernard, Radiation-driven shock and debris propagation down a partitioned pipe. *Int. J. Impact Eng.* **26**, 189–200 (2001b)
- M.D. Furnish, J. Robbins, W.M. Trott, L.C. Chhabildas, R.J. Lawrence, S.T. Montgomery, Multidimensional validation impact tests on PZT 95/5 and ALOX, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, N.N. Thadhani, Y. Horie. AIP Conference Proceedings, vol. 620 (AIP, College Park, MD, 2002), pp. 205–208
- M.D. Furnish, M.E. Kipp, W.D. Reinhart, T.J. Vogler, W.W. Anderson, R.S. Hixson, Exploring pulse shaping for Z using graded-density impactors on gas guns (final report for LDRD Project 79879), SAND2005-6210 (Sandia National Laboratories, Albuquerque, NM, 2005)
- M.D. Furnish, W.D. Reinhart, W.M. Trott, L.C. Chhabildas, T.J. Vogler, Variability in dynamic properties of tantalum: Spall, Hugoniot elastic limit and attenuation, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, M. Elert, T.P. Russell, C.T. White. AIP Conference Proceedings, vol. 845 (AIP, College Park, MD, 2006), pp. 615–618
- M. Furnish, T.J. Vogler, C.S. Alexander, W.D. Reinhart, W.M. Trott, L.C. Chhabildas, Statistics of the Hugoniot elastic limit from line VISAR, in *Shock Compression of Condensed Matter*, ed. by M. Elert, M.D. Furnish, R. Chau, N.C. Holmes, J. Nguyen. AIP Conference Proceedings, vol. 555 (AIP, College Park, MD, 2007), pp. 521–524
- M.D. Furnish, L.C. Chhabildas, W.D. Reinhart, W.M. Trott, T.J. Vogler, Determination and interpretation of statistics of spatially resolved waveforms in spalled tantalum for 7 to 13 GPa. *Int. J. Plast.* **25**, 587–602 (2009)
- J.M. Galbraith, L.E. Murr, A.L. Stevens, Electron microscopy of shock-loaded polycrystalline beryllium, in *32nd Annual Proceedings Electron Microscopy Society of America*, ed. by C.J. Arceneaux (Claitor's Publishing Co., Baton Rouge, LA, 1974), pp. 506–507
- C.W. Gillard, G.S. Ishikawa, J.E. Peterson, J.L. Rapier, J.C. Stover, N.L. Thomas, Laser Velocimeter Development Program AD0834874 (Research and Development Division, Lockheed Missiles and Space Company, Inc., Palo Alto, CA, 1968)
- S.F. Glover, L.X. Schneider, K.W. Reed et al., Genesis: A 5 MA programmable pulsed power driver for isentropic compression experiments. *IEEE Trans. Plasma Sci.* **38**(10), 2620–2626 (2010)
- M.R. Gomez, S.A. Slutz, A.B. Sefkow, K.D. Hahn, S.B. Hansen, P.F. Knapp, P.F. Schmit, C.L. Ruiz, D.B. Sinars, E.C. Harding, C.A. Jennings, T.J. Awe, M. Geissel, D.C. Rovang, I.C. Smith, G.A. Chandler, G.W. Cooper, M.E. Cuneo, A.J. Harvey-Thompson, M.C. Herrmann, M.H. Hess, D.C. Lamma, M.R. Nartin, R.D. McBride, K.J. Peterson, J.L. Porter, G.A. Rochau, M.E. Savage, D.G. Schroen, W.A. Stygar, R.A. Vesey, Demonstration of thermonuclear conditions in magnetized liner inertial fusion experiments. *Phys. Plasmas* **22**, 056306 (2015)
- D.E. Grady, R.E. Hollenbach, High strain rate studies in rock. *Geophys. Res. Lett.* **4**, 263–266 (1977)

- D.E. Grady, R.E. Hollenbach, K.W. Schuler, J.F. Callender, Strain rate dependence in dolomite inferred from impact and static compression studies. *J. Geophys. Res. – Solid Earth and Planets* **82**(8), 1325–1333 (1977)
- D.E. Grady, R.E. Hollenbach, K.W. Schuler, Compression wave studies in calcite rock. *J. Geophys. Res.* **83**, 2839–2849 (1978)
- D.E. Grady, Interrelation of flow or fracture and phase transition in the deformation of carbonate rock. *J. Geophys. Res.* **84**(B13), 7549–7555 (1979)
- D.E. Grady, M.E. Kipp, The micromechanics of impact fracture of rock. *Int. J. Rock Mech. Mining Sci.* **16**, 293–302 (1979)
- D.E. Grady, Shock deformation in brittle solids. *J. Geophys. Res.* **85**(B2), 913–924 (1980)
- D.E. Grady, M.E. Kipp, Continuum modeling of explosive fracture in oil shale. *Int. J. Rock Mech. Mining Sci.* **17**, 149–157 (1980)
- D.E. Grady, Fragmentation of solids under impulsive stress loading. *J. Geophys. Res.* **86**, 1047–1054 (1981a)
- D.E. Grady, Strain-rate dependence of effective viscosity under steady-wave shock compression. *Appl. Phys. Lett.* **38**, 825–826 (1981b)
- D.E. Grady, Fragment size prediction in dynamic fragmentation, in *Shock Waves in Condensed Matter*, ed. by W.J. Nellis, L. Seaman, R.A. Graham. AIP Conference Proceedings, vol. 78 (AIP, College Park, MD, 1982a), pp. 456–459
- D.E. Grady, Local inertial effects in dynamic fragmentation. *J. Appl. Phys.* **53**(1), 322–325 (1982b)
- D.E. Grady, Analysis of prompt fragmentation in explosively-loaded uranium cylindrical shells, SAND82-0140 (Sandia National Laboratories, Albuquerque, NM, 1982c)
- D.E. Grady, J.R. Asay, Calculation of thermal trapping in shock deformation of aluminum. *J. Appl. Phys.* **54**, 7350–7354 (1982)
- D.E. Grady, J.R. Asay, R.W. Rohde, J.L. Wise, Microstructure and mechanical properties of precipitation hardened aluminum under high rate deformation, in *Material Behavior Under High Stress and Ultrahigh Loading Rates* (Sagamore Army Materials Research Conference Proceedings), ed. by J. Mescall, V. Weiss, vol. 29 (Plenum, New York, NY, 1983), pp. 81–100
- D.E. Grady, Microstructural effects on wave propagation in solids. *Int. J. Eng. Sci.* **22**, 1181–1186 (1984)
- D.E. Grady, M.E. Kipp, D.A. Benson, Energy and statistical effects in the dynamic fragmentation of metal rings. *Proceedings of the Conference of the Mechanical Properties of High Rates of Strain*, Inst. Phys. Conf. Series No. 70, 315–320 (1984)
- D.E. Grady, M.E. Kipp, Geometric statistics and dynamic fragmentation. *J. Appl. Phys.* **58**(3), 1210–1222 (1985a)
- D.E. Grady, M.E. Kipp, Mechanisms of dynamic fragmentation: factors governing fragment size. *Mechanics of Materials* **4**, 311–320 (1985b)
- D.E. Grady, M.D. Furnish, Shock- and release-wave properties of MJ-2 grout, SAND88-1642 (Sandia National Laboratories, Albuquerque, NM, 1988)
- D.E. Grady, Particle size statistics in dynamic fragmentation. *J. Appl. Phys.* **68**(12), 6099–6105 (1990)
- D.E. Grady, M.D. Furnish, Hugoniot and release properties of a water-saturated high-silica-content grout, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, J.N. Johnson, L.W. Davison (Elsevier, Amsterdam, 1990), pp. 621–624
- D.E. Grady, Dynamics of adiabatic shear. *Journal de Physique IV, Colloque C3 Suppl.*, Vol. 1, 653–660 (1991)
- D.E. Grady, Shock-compression properties of ceramics, in *Recent Trends in High-Pressure Research* (Proceedings of the International Conference on High Pressure Science and Technology, AIRAPT-XIII), ed. by A.K. Singh (Oxford and IBH Publishing, Oxford, 1992), pp. 641–650
- D.E. Grady, Dynamic fracture and fragmentation, in *High-Pressure Shock Compression of Solids*, ed. by J.R. Asay, M. Shahinpoor (Springer, New York, NY, 1993), pp. 265–322
- D.E. Grady, Dynamic failure in brittle solids, in *Fracture and Damage of Quasi-Brittle Structures*, ed. by Z. Bazant et al. (E&FN Spon Publications, London, 1994), pp. 259–273

- D.E. Grady, Spall and fragmentation in high-temperature metals, in *High-Pressure Shock Compression of Solids II*, ed. by L. Davison, D.E. Grady, M. Shahinpoor (Springer, New York, NY, 1995a), pp. 219–236
- D.E. Grady, Dynamic properties of ceramic materials, SAND94-3266 (Sandia National Laboratories, Albuquerque, NM, 1995b)
- D.E. Grady, Shock wave compression of brittle solids. *Mechanics of Materials* **29**, 181–203 (1998)
- D.E. Grady, N.A. Winfree, G.I. Kerley, L.T. Wilson, L.D. Kuhns, Computational modeling and wave propagation in media with inelastic deforming microstructure. *J. Phys. IV* **10**, 15–20 (2000)
- D.E. Grady, N.A. Winfree, A computational model for polyurethane foam, in *Fundamental Issues and Applications of Shock-Wave and High-Strain-Rate Phenomena*, ed. by K.P. Staudhammer, L.E. Murr, M.A. Meyers (Elsevier, New York, NY, 2001), pp. 485–491
- D.E. Grady, M.L. Olsen, A statistical and energy based theory of dynamic fragmentation. *Int. J. Impact Eng.* **29**, 293–306 (2003)
- D.E. Grady, *Fragmentation of Rings and Shells – The Legacy of N. F. Mott* (Springer, New York, NY, 2006)
- D.E. Grady, Fragment size distributions from the dynamic fragmentation of brittle solids. *Int. J. Impact Eng.* **35**, 1557–1562 (2008)
- D.E. Grady, Dynamic fragmentation of solids, in *Shock Wave Science Technology Reference Library. Solids II*, ed. by Y. Horie, vol. 3 (Springer, New York, NY, 2009), pp. 169–276
- D.E. Grady, Structured shock waves and the fourth-power law. *J. Appl. Phys.* **107**, 013506 (2010a)
- D.E. Grady, Length scales and size distributions in dynamic fragmentation. *Int. J. Fracture* **163**, 85–99 (2010b)
- D.E. Grady, Adiabatic shear failure in brittle solids. *Int. J. Impact Eng.* **38**, 661–667 (2011)
- D.E. Grady, G. Fenton, T. Vogler, Equation of state and evidence of enhanced phase transformation for shock compression of distended compounds. *Int. J. Impact Eng.* **56**, 19–26 (2013)
- D.E. Grady, Unifying role of dissipative action in the dynamic failure of solids. *J. Appl. Phys.* **117**, 165905 (2015)
- D.E. Grady, Diffusion of dissipative correlation in the dynamic failure of solids (private communication, 2016)
- R.A. Graham, Impact physics, SCR-59 (Sandia National Laboratories, Albuquerque, NM, 1958)
- R.A. Graham, Piezoelectric behavior of impacted quartz. *J. Appl. Phys.* **32**(3), 555 (1961a)
- R.A. Graham, Technique for studying piezoelectricity under transient high stress conditions. *Rev. Sci. Instrum.* **32**(12), 1308–1313 (1961b)
- R.A. Graham, G.E. Ingram, W.D. Ingram, Performance of a high velocity powder gun. SC-4652 (RR) (Sandia National Laboratories, Albuquerque, NM, 1961)
- R.A. Graham, Dielectric anomaly in quartz for high transient stress and field. *J. Appl. Phys.* **33**(5), 1755–1758 (1962)
- R.A. Graham, O.E. Jones, J.R. Holland, Shock-wave compression of germanium from 20 to 140 kbar. *J. Appl. Phys.* **36**, 3955–3956 (1965a)
- R.A. Graham, F.W. Neilson, W.B. Benedick, Piezoelectric current from shock-loaded quartz – A submicrosecond stress gauge. *J. Appl. Phys.* **36**(5), 1775–1783 (1965b)
- R.A. Graham, O.E. Jones, J.R. Holland, Physical behavior of germanium under shock wave compression. *J. Phys. Chem. Solids* **27**, 1519–1529 (1966)
- R.A. Graham, Impact techniques for the study of physical properties of solids under shock-wave loading. *J. Basic Eng. Trans. ASME* **89**, 911–918 (1967)
- R.A. Graham, R.E. Hutchison, Thermoelastic stress pulses resulting from pulsed electron beams. *Appl. Phys. Lett.* **11**(2), 69–71 (1967)
- R.A. Graham, D.H. Anderson, J.R. Holland, Shock wave compression of 30% Ni – 70% Fe alloys: the pressure-induced magnetic transition. *J. Appl. Phys.* **38**, 223–229 (1967a)
- R.A. Graham, R.E. Hutchison, W.B. Benedick, Pulsed electron beam calorimetry utilizing stress wave measurements in solid absorbers, in *9th IEEE Annual Symposium on Electron, Ion, and Laser Beam Technology*, ed. by R.F.W. Pease (San Francisco Press, San Francisco, CA, 1967b), pp. 70–76

- R.A. Graham, W.J. Halpin, Dielectric breakdown and recovery of X-cut quartz under shock-wave compression. *J. Appl. Phys.* **39**(11), 5077–5082 (1968)
- R.A. Graham, G.E. Ingram, A shock-wave stress gauge utilizing the capacitance change of a solid dielectric disc, in *Behavior of Dense Media Under High Dynamic Pressure*, ed. by J. Berger (Gordon and Breach, New York, NY, 1968), pp. 469–482
- R.A. Graham, O.E. Jones, A summary of Hugoniot elastic limit measurements, SC-R-68-1857 (Sandia National Laboratories, Albuquerque, NM, 1968)
- R.A. Graham, Linear bulk modulus approximation for sapphire. *J. Geophys. Res.* **76**(20), 4908–4912 (1971)
- R.A. Graham, W.P. Brooks, Shock-wave compression of sapphire from 15 to 420 kbar: The effects of large anisotropic compressions. *J. Phys. Chem. Solids* **32**, 2311–2330 (1971)
- R.A. Graham, Determination of third- and fourth-order longitudinal elastic constants by shock compression techniques: Application to sapphire and fused quartz. *J. Acoust. Soc. Am.* **51**(5), 1576–1581 (1972a)
- R.A. Graham, Strain dependence of longitudinal, piezoelectric elastic, and dielectric constants of X-cut quartz. *Phys. Rev. B* **6**(12), 4779–4792 (1972b)
- R.A. Graham, Plasticity analysis in soil mechanics problems, in *Problems of Plasticity*, ed. by A. Sawczuk (Noordhoff International Publication, Leyden, 1973), pp. 392–396
- R.A. Graham, R.D. Jacobson, Lithium niobate stress gauge for pulsed radiation deposition studies. *Appl. Phys. Lett.* **23**(11), 584–586 (1973)
- R.A. Graham, Shock-wave compression of X-cut quartz as determined by electrical response measurements. *J. Phys. Chem. Solids* **35**, 355–372 (1974)
- R.A. Graham, Piezoelectric current from shunted and shorted guard-ring quartz gauges. *J. Appl. Phys.* **46**(5), 1901–1909 (1975)
- R.A. Graham, P.J. Chen, A new electrical to mechanical coupling effect for nonlinear piezoelectric solids. *Solid State Commun.* **17**, 469–471 (1975)
- R.A. Graham, L.C. Yang, Inherent time delay for dielectric breakdown in shock loaded X-cut quartz. *J. Appl. Phys.* **46**(12), 5300–5301 (1975)
- R.A. Graham, Pressure dependence of the piezoelectric polarization of LiNbO_3 and LiTaO_3 . *Ferroelectrics* **10**, 65–69 (1976)
- R.A. Graham, Second- and third-order piezoelectric stress constants of lithium niobate as determined by the impact-loading technique. *J. Appl. Phys.* **48**(6), 2153–2163 (1977)
- R.A. Graham, J.R. Asay, Measurement of wave profiles in shock-loaded solids. *High Temp. High Press.* **10**(4), 355–390 (1978)
- R.A. Graham, R.P. Reed (eds.), *Selected Papers on Piezoelectricity and Impulsive Pressure Measurements*, SAND78-1911 (Sandia National Laboratories, Albuquerque, NM, 1978)
- R.A. Graham, Measurement of wave profiles in shock-loaded solids, in *High-Pressure Science and Technology*, ed. by K.D. Timmerhaus, M.S. Barber, vol. 2 (Plenum, New York, NY, 1979a), pp. 854–869
- R.A. Graham, Shock-induced electrical activity in polymeric solids. A mechanically induced bond scission model. *J. Phys. Chem.* **83**(23), 3048–3056 (1979b)
- R.A. Graham, Electrical activity in shock-loaded polymers, in *High Pressure in Science and Technology*, ed. by K.D. Timmerhaus, M.S. Barber (Pergamon, Oxford, 1980), pp. 1032–1039
- R.A. Graham, Active measurements of defect processes in shock-compressed metals and other solids, in *Metallurgical Effects of High-Strain-Rate Deformation and Fabrication*, ed. by M.A. Meyers, L.E. Murr (Plenum, New York, NY, 1981), pp. 375–386
- R.A. Graham, B. Morosin, B.W. Dodson, The chemistry of shock compression: A bibliography, SAND83-1887 (Sandia National Laboratories, Albuquerque, NM, 1983)
- R.A. Graham, D.B. Webb, Fixtures for controlled explosive loading and preservation of powder samples, in *Shock Waves in Condensed Matter*, ed. by J.R. Asay, R.A. Graham, G.K. Straub (Elsevier, Amsterdam, 1984), pp. 211–216
- R.A. Graham, M.J. Carr, Analytical electron microscopy study of shock synthesized zinc ferrite, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 803–808

- R.A. Graham, D.M. Webb, Shock-induced temperature distributions in powder compact recovery fixtures, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 589–593
- R.A. Graham, B. Morosin, Y. Horie, E.L. Venturini, M.B. Boslough, M.J. Carr, D.L. Williamson, Chemical synthesis under shock compression, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986a), pp. 693–711
- R.A. Graham, B. Morosin, E.L. Venturini, M.J. Carr, E.K. Beauchamp, Shock-compression processes in inorganic powders, in *Metallurgical Applications of Shock-Wave and High-Strain-Rate Phenomena*, ed. by L.E. Murr, K.P. Staudhammer, M.A. Meyers (Marcel Dekker, New York, NY, 1986b), pp. 1005–1012
- R.A. Graham, Shock compression of solids as a physical-chemical-mechanical process, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 11–19
- R.A. Graham, L.M. Lee, F. Bauer, Response of Bauer piezoelectric polymer stress gauges (PVDF) to shock loading, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988a), pp. 619–622
- R.A. Graham, B. Morosin, D.M. Bush, Shock-induced melting of a KCl:LiCl eutectic powder as determined from electrochemical response measurements, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988b), pp. 179–184
- R.A. Graham, Issues in shock-induced solid state chemistry, in *Behavior of Dense Media under High Dynamic Pressures* (3rd International Symposium High Dynamic Pressures), ed. by R. Cheret (Association Francaise de Pyrotechnie, Paris, 1989), pp. 175–180
- R.A. Graham, M.U. Anderson, F. Bauer, R.E. Setchell, Piezoelectric polarization of the ferroelectric polymer PVDF from 10 MPa to 10 GPa: Studies of loading-path dependence, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, R.D. Dick, J.W. Forbes, D.G. Tasker (Elsevier, Amsterdam, 1992), pp. 883–886
- F.V. Grigoryev, S.B. Korner, O.L. Mikhailova, A.P. Tolochko, V.D. Urlin, Experimental determination of the compressibility of hydrogen at densities 0.5–2 g/cm³. JETP Lett. **16**, 201–204 (1972)
- T.R. Guess, L.M. Lee, Spall strengths of five carbon materials. SC-DR-68-604 (Sandia National Laboratories, Albuquerque, NM, 1968)
- T.A. Haill, C.J. Garasi, A.C. Robinson, ALEGRA-MHD: Version 4.0, SAND2003-4074 (Sandia National Laboratories, Albuquerque, NM, 2003) [Superseded by T.A. Haill, K.R. Cochrane, C.J. Garasi, T.A. Mehlhorn, A.C. Robinson, and R.M. Summers, ALEGRA-MHD: Version 4.6, SAND2004-5997 (Sandia National Laboratories, Albuquerque)]
- T.A. Haill, K.R. Cochrane, C.J. Garasi, T.A. Mehlhorn, A.C. Robinson, and R.M. Summers, ALEGRA-MHD: Version 4.6, SAND2004-5997 (Sandia National Laboratories, Albuquerque, NM, 2005)
- T.A. Haill, T.A. Mehlhorn, J.R. Asay, Y.M. Gupta, R.J. Lawrence, C.J. Bakeman, J. LaFollett, A feasibility study for a fragment-producing chemical electrical launcher, in *2007 16th IEEE International Pulsed Power Conference* (IEEE Piscataway, NJ, 2007), vol. 2, pp. 1753–1756
- T.A. Haill, C.S. Alexander, J.R. Asay, Simulation and analysis of Magnetically-Applied Pressure-Shear (MAPS) experiments, *18th IEEE International Pulsed Power Conference* (IEEE Piscataway, NJ, 2011), pp. 1093–1098
- T.A. Haill, T.R. Mattsson, S. Root et al., Mesoscale simulation of shocked poly-(4-methyl-1-pentene) (PMP) foams, in *Shock Compression of Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, J.P. Borg, J.L. Jordan, T.J. Vogler. AIP Conference Proceedings, vol. 1426 (AIP, College Park, MD, 2012), pp. 913–916
- T.A. Haill, T.R. Mattsson, S. Root et al., Mesoscale simulation of mixed equations of state with application to shocked platinum-doped PMP foams, in *Proceedings of the 12th Hypervelocity Impact Symposium*, Procedia Engineering **58**, 309–319 (2013)
- C.A. Hall, L.C. Chhabildas, W.D. Reinhart, Shock Hugoniot and release in concrete with different aggregate sizes from 3 to 23 GPa. Int. J. Impact Eng. **23**, 341–351 (1999)
- C.A. Hall, J.R. Asay, W.M. Trott, M. Knudson, K.J. Fleming, M.A. Bernard, B.F. Clark, A. Hauer, G. Kyrala, Aluminum Hugoniot measurements on the Sandia Z accelerator, in *Shock*

- Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson. AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 1171–1174
- C.A. Hall, J.R. Asay, M.D. Knudson, W.A. Stygar, R.B. Spielman, T.D. Pointon, D.B. Reisman, A. Toor, R.C. Cauble, Isentropic compression of solids using pulsed magnetic fields. *Rev. Sci. Instrum.* **72**(9), 3587–3595 (2001a)
- C.A. Hall, M.D. Knudson, J.R. Asay et al., High velocity flyer plate launch capability on the Sandia Z accelerator. *Int. J. Impact Eng.* **26**, 275–287 (2001b)
- C.A. Hall, J.R. Asay, M.D. Knudson, D.B. Hayes, R.W. Lemke, J.-P. Davis, C. Deeney, Recent advances in quasi-isentropic compression experiments (ICE) on the Sandia Z accelerator, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, N.N. Thadhani, Y. Horie. AIP Conference Proceedings, vol. 620 (AIP, College Park, MD, 2002), pp. 1163–1168
- W.J. Halpin, O.E. Jones, R.A. Graham, A submicrosecond technique for simultaneous observation of input and propagated impact stresses, in *Symposium on Dynamic Behavior of Materials* (ASTM Special Technical Publications No. 336), (American Society for Testing and Materials, Philadelphia, PA, 1963), pp. 208–218
- W.J. Halpin, R.A. Graham, Shock wave compression of Plexiglas from 3 to 20 kilobars, in *Proceedings of the 4th International Detonation Symposium*, ONR ACR-126, ed. by S.J. Jacobs, D. Price (Office of Naval Research, Washington, D.C., 1965), pp. 222–232
- H.B. Hammel, R.F. Beebe, A.P. Ingersoll et al., HST imaging of atmospheric phenomena created by the impact of Comet Shoemaker-Levy 9. *Science* **267**, 1288–1296 (1995)
- W.F. Hammett, J.R. Hellmann, R.A. Graham, B. Morosin, Energy release and transformation of shock-modified zirconia upon annealing to 1550 degrees C, in *Shock Waves in Condensed Matter*, ed. by J.R. Asay, R.A. Graham, G.K. Straub (Elsevier, Amsterdam, 1984), pp. 391–394
- W.F. Hammett, R.A. Graham, B. Morosin, Y. Horie, Effects of shock modification on the self-propagating high temperature synthesis of nickel aluminides, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 431–434
- D.L. Hanson, J.R. Asay, C.A. Hall, M.D. Knudson, J.E. Bailey, K.J. Fleming, R.R. Johnston, B.F. Clark, M.A. Bernard, W.W. Anderson, G. Hassall, S.D. Rothman, Progress on deuterium measurements on Z, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson. AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 1175–1178
- D.L. Hanson, R.R. Johnston, M.D. Knudson, J.R. Asay, C.A. Hall, J.E. Bailey, R.J. Hickman, Advanced cryogenic system capabilities for precision shock physics measurements on Z, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, N.N. Thadhani, Y. Horie. AIP Conference Proceedings, vol. 620 (AIP, College Park, MD, 2002a), pp. 1141–1144
- D.L. Hanson, M.D. Knudson, J.R. Asay, C.A. Hall, J.E. Bailey, R.W. Lemke, J.-P. Davis, R.B. Spielman, B.V. Oliver, D.B. Hayes, Precision shock physics capabilities for inertial fusion studies using the Z accelerator current drive, in *Inertial Fusion Sciences and Applications*, ed. by K.A. Tanaka, D.D. Meyerhofer, J. Meyer-ter-Vehn (Elsevier, Paris, 2002b), pp. 1091–1095
- D.R. Hardesty, P.C. Lysne, Shock initiation and detonation properties of homogeneous explosives, SLA-74-0165 (Sandia National Laboratories, Albuquerque, NM, 1974)
- D.R. Hardesty, An investigation of the shock initiation of liquid nitromethane. *Combust. Flame* **27**, 229–251 (1976a)
- D.R. Hardesty, On the index of refraction of shock-compressed liquid nitromethane. *J. Appl. Phys.* **47**(5), 1994–1998 (1976b)
- D.R. Hardesty, J.E. Kennedy, Thermochemical estimation of explosive energy output. *Combust. Flame* **43**, 45–59 (1977)
- J.K. Hartman, J.L. Wise, R.A. Graham, R.O. Johnson, G.E. Clark, T.J. Burns, Microwave dielectric constant of shock-loaded lithium niobate, in *Shock Waves in Condensed Matter*, ed. by W.J. Nellis, L. Seaman, R.A. Graham. AIP Conference Proceedings, vol. 78 (AIP, College Park, MD, 1982), pp. 277–281
- R.S. Hawke, Experiments on hydrogen at megabar pressures: Metallic hydrogen, in *Festkörperprobleme* **14**, ed. by H.J. Queisser (Springer, Berlin, 1974), pp. 111–118

- R.S. Hawke, A.R. Susoeff, J.A. Ang, C.H. Konrad, C.A. Hall, G.L. Sauve, A.R. Vesey, Performance of hypervelocity armatures with replenished metal vapor plasmas, in *Third European Electromagnetic Launcher Symposium Proceedings*, UCRL-JC-106828 (Lawrence Livermore National Laboratory, Livermore, CA, 1991a)
- R.S. Hawke, A.R. Susoeff, J.R. Asay, J.A. Ang, C.A. Hall et al., Railgun performance with a two-stage light-gas gun injector. *IEEE Trans. Magnetics* **27**, 28–32 (1991b)
- D.B. Hayes, L. Kennedy, Unfolding of quartz gage records, SC-TM-690635 (Sandia National Laboratories, Albuquerque, NM, 1969)
- D.B. Hayes, Wave propagation in a condensed medium with N transforming phases: Application to solid-I-solid-II-liquid bismuth. *J. Appl. Phys.* **46**, 3438–3443 (1975)
- D.B. Hayes, D.E. Mitchell, A constitutive equation for the shock response of porous hexanitrostilbene (HNS) explosive, at Symposium on High Pressures, Commissariat a l'Energie Atomique, Paris, France, on August 22, 1978
- D.B. Hayes, D.E. Grady, A thermal-viscous model for heterogeneous yielding in aluminum, in *Shock Waves in Condensed Matter*, ed. by W.J. Nellis, L. Seaman, R.A. Graham. AIP Conference Proceedings, vol. 78 (AIP, College Park, MD, 1982), pp. 412–415
- D.B. Hayes, Unsteady compression waves in interferometer windows. *J. Appl. Phys.* **89**, 6484–6486 (2001)
- D.B. Hayes, C.A. Hall, J.R. Asay, M.D. Knudson, Continuous index of refraction measurements to 20 GPa in Z-cut sapphire using pulsed magnetic loading. *J. Appl. Phys.* **94**, 2331–2336 (2003)
- D.B. Hayes, C.A. Hall, J.R. Asay, M.D. Knudson, Measurement of the compression isentrope for 6061-T6 aluminum to 185 GPa and 46% volumetric strain using pulsed magnetic loading. *J. Appl. Phys.* **96**(10), 5520–5527 (2004)
- J.R. Hellmann, K. Kuroda, A.H. Heuer, R.A. Graham, Microstructural characterization of shock-modified zirconia powders, in *Shock Waves in Condensed Matter*, ed. by J.R. Asay, R.A. Graham, G.K. Straub (Elsevier, Amsterdam, 1984), pp. 387–390
- F. Herlach, J.E. Kennedy, The dynamics of imploding liners in magnetic flux compression experiments. *J. Phys. D Appl. Phys.* **6**, 661–676 (1973)
- W. Herrmann, E.A. Witmer, J.H. Percy, A.H. Jones, Stress wave propagation and spallation in uniaxial strain. ASD-TDR-62-399 (Air Force Systems Command, 1962)
- W. Herrmann, A Lagrangian finite difference method for two-dimensional motion including material strength. WL-TR-64-107 (Air Force Weapons Laboratory, 1964)
- W. Herrmann, P. Holzhauser, R.J. Thompson, WONDY—A computer program for calculating problems of motion in one dimension, SC-RR-66-601 (Sandia National Laboratories, Albuquerque, NM, 1967)
- W. Herrmann, Equation of state of crushable distended materials, SC-RR-66-2678 (Sandia National Laboratories, Albuquerque, NM, 1968)
- W. Herrmann, Constitutive equation for the dynamic compaction of ductile porous materials. *J. Appl. Phys.* **40**(6), 2490–2499 (1969a)
- W. Herrmann, On the dynamic compaction of initial heated porous materials, SC-DR-680865 (Sandia National Laboratories, Albuquerque, NM, 1969b)
- W. Herrmann, Nonlinear stress waves in metals, in *Wave Propagation in Solids*, ed. by J. Miklowitz (American Society of Mechanical Engineers, New York, NY, 1969c), pp. 129–183
- W. Herrmann, R.J. Lawrence, D.S. Mason, Strain hardening and strain rate in one-dimensional wave propagation calculations, SC-RR-70-471 (Sandia National Laboratories, Albuquerque, NM, 1970)
- W. Herrmann, Constitutive equations for compaction of porous materials, in *Applied Mechanics Aspects of Nuclear Effects*, ed. by C.C. Wan (American Society of Mechanical Engineers, New York, NY, 1971), pp. 142–168
- W. Herrmann, D.L. Hicks, E.G. Young, Attenuation of elastic-plastic stress waves, in *Shock Waves and the Mechanical Properties of Solids*, ed. by J.J. Burke, V. Weiss (Syracuse University Press, Syracuse, NY, 1971), pp. 23–64

- W. Herrmann, Constitutive equations for the compaction of porous materials, SC-DC-71-4134 (Sandia National Laboratories, Albuquerque, NM, 1972)
- W. Herrmann. On the evaluation of constitutive equations from experiment, in *Recent Advances in Engineering Science* **6**, (Proceedings of the Society of Engineering Science 10th Anniversary Meeting, 1973), pp. 297–307
- W. Herrmann, J.W. Nunziato, Nonlinear constitutive equations (Chapter 5), in *Dynamic Response of Materials to Intense Impulsive Loading*, ed. by P.C. Chou, A.K. Hopkins (Air Force Materials Laboratory, Wright-Patterson AFB, OH, 1973)
- W. Herrmann, Development of a high strain rate constitutive equation for 6061-T6 aluminum, SLA-73-0897 (Sandia National Laboratories, Albuquerque, NM, 1974)
- W. Herrmann, R.J. Lawrence, The effect of material constitutive models on stress wave propagation calculations. *J. Eng. Mater. Technol. Trans. ASME* **100**, 84–95 (1978)
- W. Herrmann, On constitutive modelling for the shock physicist, in *Shock Waves in Condensed Matter*, ed. by W.J. Nellis, L. Seaman, R.A. Graham. AIP Conference Proceedings, vol. 78 (AIP, College Park, MD, 1982), pp. 346–359
- W. Herrmann, L.D. Bertholf, Explicit Lagrangian finite-difference methods, in *Computational Methods for Transient Analysis* (Mechanics and Mathematical Methods—Series of Handbooks), ed. by T. Belytschko, T. Hughes, vol. 1 (Elsevier, North-Holland, 1983), pp. 361–415
- W. Herrmann, W.R. Wawersik, S.T. Montgomery, Review of creep modeling for rock salt, in *Mechanics of Engineering Materials*, ed. by C.C. Desai, R.H. Gallagher (Wiley, NY, 1984), pp. 297–317
- D.G. Hicks, T.R. Boehly, P.M. Celliers, J.H. Eggert, S.J. Moon, D.D. Meyerhofer, G.W. Collins, Laser-driven single shock compression of fluid deuterium from 45 to 220 GPa. *Phys. Rev. B* **79**, 014112 (2009)
- D.L. Hicks, Von Neumann stability of the WONDY wavecode for thermodynamic equations of state, SAND77-0934 (Sandia National Laboratories, Albuquerque, NM, 1977)
- D.L. Hicks, F.R. Norwood, T.G. Trucano, TOODY-WONDY calculations of penetration events, in *Shock Waves in Condensed Matter*, ed. by W.J. Nellis, L. Seaman, R.A. Graham. AIP Conference Proceedings, vol. 78 (AIP, College Park, MD, 1982), pp. 544–547
- M.L. Hobbs, M.R. Baer, B.C. McGee, JCZS: An intermolecular potential database for performing accurate detonation and expansion calculations. *Propellants, Explosives and Pyrotechnics* **24**(5), 269–279 (1999)
- B.L. Holian, D.E. Grady, Fragmentation by molecular dynamics: The microscopic “big bang”. *Phys. Rev. Lett.* **60**(14), 1355–1358 (1988)
- K.G. Holland, L.C. Chhabildas, W.D. Reinhart, M.D. Furnish, Experiments of cercom SiC rods under impact, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson. AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 585–588
- A.C. Holt, M.M. Carroll, B.M. Butcher, Application of a new theory for the pressure-induced collapse of pores in ductile materials, in *Proceedings of the RILEM-IUPAC International Symposium on Pore Structure and Properties of Materials Part 5*, ed. by S. Modry (Academia, Prague, 1974), pp. 63–76
- Y. Horie, R.A. Graham, I.K. Simonsen, Observations on the shock-synthesis of intermetallic compounds, in *Metallurgical Applications of Shock-Wave and High-Strain-Rate Phenomena*, ed. by L.E. Murr, K.P. Staudhammer, M.A. Meyers (Marcel Dekker, New York, NY, 1986a), pp. 1023–1035
- Y. Horie, D.E.P. Hoy, I.K. Simonsen, R.A. Graham, B. Morosin, Shock synthesis of titanium aluminides, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986b), pp. 749–754
- Y. Horie, M.E. Kipp, Modeling of shock-induced chemical reactions in powder mixtures. *J. Appl. Phys.* **63**(12), 5718–5727 (1988)
- G.R. Hough, D.M. Gustafson, R.E. Thursby, Enhanced holographic recording capabilities for dynamic applications, in *Proceedings of the SPIE Ultrahigh and High Speed Photography*,

- Photons, and Velocimetry 1989 Conference*, ed. by P.A. Jaanimagi, vol. 1155 (SPIE, Bellingham, WA, 1990), pp. 181–188
- H. Huang, J.R. Asay, Compressive strength measurements in aluminum for shock compression over the stress range of 4–22 GPa. *J. Appl. Phys.* **98**, 033524 (2005)
- C.F. Huff, R.A. Graham, Pressure measurements very near an electrical arc discharge in a liquid using a lithium niobate piezoelectric transducer. *Appl. Phys. Lett.* **27**(4), 163–164 (1975)
- G.E. Ingram, R.A. Graham, Quartz gauge technique for impact experiments, in *Fifth Symposium (International) on Detonation*, ACR 184 (Office of Naval Research, Washington, D.C., 1970), pp. 369–386
- B.J. Jensen, D.B. Holtkamp, P.A. Rigg, D.H. Dolan, Accuracy limits and window corrections for photon Doppler velocimetry. *J. Appl. Phys.* **101**, 13523 (2007)
- J.N. Johnson, Shock waves in stress-relaxing solids, WSU SDL 66-01 (Washington State University, Pullman, WA, 1966)
- J.N. Johnson, Basic Theory of irreversible thermodynamics with application to the anelastic solids, Internal Report No. 01-67 (Washington State University, Pullman, WA, 1967)
- J.N. Johnson, W. Band, Investigation of precursor decay in iron by the artificial viscosity method. *J. Appl. Phys.* **38**(4), 1578–1585 (1967)
- J.N. Johnson, A theory of rate-dependent behavior for porous solids: Steady-propagating compaction wave profiles, SC-RR-68-151 (Sandia National Laboratories, Albuquerque, NM, 1968a)
- J.N. Johnson, Elastic precursor decay in quartzite for cylindrical and spherical flow. *J. Appl. Phys.* **39**(1), 290–296 (1968b)
- J.N. Johnson, Single-particle model of a solid: The Mie-Grüneisen equation. *Am. J. Phys.* **36**(10), 917–919 (1968c)
- J.N. Johnson, Constitutive relation for rate-dependent plastic flow in polycrystalline metals. *J. Appl. Phys.* **40**(5), 2287–2293 (1969)
- J.N. Johnson, L.M. Barker, Dislocation dynamics and steady plastic wave profiles in 6061-T6 aluminum. *J. Appl. Phys.* **40**(11), 4321–4334 (1969)
- J.N. Johnson, O.E. Jones, T.E. Michaels, Dislocation dynamics and single-crystal constitutive relations: Shock-wave propagation and precursor decay. *J. Appl. Phys.* **41**(6), 2330–2339 (1970)
- J.N. Johnson, Shock propagation produced by planar impact in linearly elastic anisotropic media. *J. Appl. Phys.* **42**(13), 5522–5530 (1971)
- J.N. Johnson, R.W. Rohde, Dynamic deformation twinning in shock-loaded iron. *J. Appl. Phys.* **42**(11), 4171–4182 (1971)
- J.N. Johnson, An analysis of thermally-induced plane waves in elastic-plastic single crystals. *J. Mech. Phys. Solids* **20**, 367–380 (1972a)
- J.N. Johnson, Calculation of plane-wave propagation in anisotropic elastic-plastic solids. *J. Appl. Phys.* **43**(5), 2074–2082 (1972b)
- J.N. Johnson, Considerations for the calculation of shock-induced phase transformations in solids, SC-RR-72-0626 (Sandia National Laboratories, Albuquerque, NM, 1972c)
- J.N. Johnson, Inelastic plane-wave propagation in anisotropic rocks. *J. Geophys. Res.* **79**(32), 4900–4907 (1974a)
- J.N. Johnson, Wave velocities in shock-compressed cubic and hexagonal single crystals above the elastic limit. *J. Phys. Chem. Solids* **35**(5), 609–616 (1974b)
- J.N. Johnson, Kinematic waves and group velocity: Application to natural and manmade environment. *Am. J. Phys.* **43**, 681–688 (1974c)
- J.N. Johnson, J.R. Asay, D.B. Hayes, Equations of state and shock-induced transformations in solid-I, solid-II, liquid bismuth. *J. Phys. Chem. Solids* **35**, 501–515 (1974)
- J.N. Johnson, L.E. Pope, Shock-wave compression of single-crystal beryllium. *J. Appl. Phys.* **46**, 720–729 (1975)
- J.N. Johnson, Micromechanical considerations in shock compression of solids, in *High-Pressure Shock Compression of Solids*, ed. by J.R. Asay, M. Shahinpoor (Springer, New York, NY, 1993), pp. 222–240
- L. Johnson, Sandia National Laboratories: A history of exceptional service in the national interest, SAND97-1029, ed. by C. Mora, J. Taylor, R. Ullrich (Sandia National Laboratories, Albuquerque, NM, 1997)

- B. Jones, C.J. Garasi, D.J. Ampleford et al., Measurement and modeling of the implosion of wire arrays with seeded instabilities. *Phys. Plasmas* **13**, 056313 (2006)
- G.E. Jones, L.D. Bertholf, J.E. Kennedy, Ballistic calculations of R. W. Gurney. *Am. J. Phys.* **48**, 264–269 (1980)
- O.E. Jones, F.W. Neilson, W.B. Benedick, Dynamic yield behavior of explosively loaded metals determined by a quartz transducer technique. *J. Appl. Phys.* **33**(11), 3224–3232 (1962)
- O.E. Jones, J.R. Holland, Bauschinger effect in explosively loaded mild steel. *J. Appl. Phys.* **35**, 1771–1773 (1964)
- O.E. Jones, Piezoelectric and mechanical behavior of X-cut quartz shock loaded at 79 degrees. *K. Rev. Sci. Instrum.* **38**(2), 253–256 (1967)
- O.E. Jones, F.R. Norwood, Axially symmetric cross-sectional strain and stress distributions in suddenly loaded cylindrical elastic bars. *J. Appl. Mech. Trans. ASME Ser. E* **89**, 718–724 (1967)
- O.E. Jones, J.R. Holland, Effects of grain size on dynamic yielding in explosively loaded mild steel. *Acta Metall.* **16**, 1037–1045 (1968)
- O.E. Jones, J.D. Mote, Shock-induced dynamic yielding in copper single crystals. *J. Appl. Phys.* **40**(12), 4920–4928 (1969)
- O.E. Jones, Shock waves and the mechanical properties of solids, in *Engineering Solids under Pressure*, ed. by H. Pugh, D. Li (Institution of Mechanical Engineers, London, 1971), pp. 75–86
- O.E. Jones, R.A. Graham, Shear strength effects on phase transition pressures determined from shock-compression experiments, in *Accurate Characterization of the High Pressure Environment*, National Bureau of Standards Special Publication 326, ed. by E.C. Lloyd (U.S. Government Printing Office, Washington, DC, 1971), pp. 229–242
- O.E. Jones, Metal response under explosive loading, in *Behavior and Utilization of Explosives in Engineering Design* (Proceedings 12th Annual Symposium New Mexico Section of the American Society of Mechanical Engineers), ed. by L.W. Davison, J. Kennedy, F. Coffey (NM Section ASME, Albuquerque, NM, 1972), pp. 125–148
- O.E. Jones, Shock wave mechanics, in *Metallurgical Effects at High Strain Rates*, ed. by R.W. Rohde, B.M. Butcher, J.R. Holland, C.H. Karnes (Plenum, New York, NY, 1973), pp. 33–55
- J.D. Kennedy, W.B. Benedick, Shock-induced polymorphic phase transformation in InSb. *Bull. Am. Phys. Soc.* **10**, 1112 (1965)
- J.D. Kennedy, W.B. Benedick, Shock-induced phase transition in single crystal CdS. *J. Phys. Chem. Solids* **27**, 125–127 (1966)
- J.E. Kennedy, Quartz gauge study of upstream reaction in a shocked explosive, in *Proceedings of the 5th International Detonation Symposium*, ONR ACR-184, ed. by S.J. Jacobs, R. Roberts (Office of Naval Research, Washington, D.C., 1970), pp. 435–445
- J.E. Kennedy, Gurney energy of explosives: Estimation of the velocity and impulse imparted to driven metal, SC-RR-70-790 (Sandia National Laboratories, Albuquerque, NM, 1971)
- J.E. Kennedy, Explosive output for driving metal, in *Behavior and Utilization of Explosives in Engineering Design*, Proceedings 12th Annual Symposium New Mexico Section of American Society of Mechanical Engineers, ed. by L.W. Davison et al. (New Mexico Section of American Society of Mechanical Engineers, New Mexico, 1972), pp. 109–124
- J.E. Kennedy, Pressure field in a shock-compressed high explosive, in *Proceedings 14th Symposium (International) on Combustion* (The Combustion Institute, 1973), vol. 14, pp. 1251–1258
- J.E. Kennedy, A.C. Schwarz, Detonation transfer by flyer plate impact, in *Proceedings 8th Symposium on Explosives and Pyrotechnics* (Franklin Institute, Philadelphia, PA, 1974)
- J.E. Kennedy, J.W. Nunziato, Shock-wave evolution in a chemically reacting solid. *J. Mech. Phys. Solids* **40**, 107–124 (1976)
- J.E. Kennedy, J.W. Nunziato, D.R. Hardesty, Initiation and detonation studies of condensed explosives using interferometric techniques. *Acta Astronaut.* **3**, 811–823 (1976)
- L.W. Kennedy, O.E. Jones, Longitudinal wave propagation in a circular bar loaded suddenly by a radially distributed end stress. *J. Appl. Mech. Trans. ASME Ser. E* **91**, 470–478 (1969)
- G.I. Kerley, Theory of ionization equilibrium: An approximation for the single element case. *J. Chem. Phys.* **85**, 5228–5231 (1986)

- G.I. Kerley, Theoretical equation of state for aluminum. *Int. J. Impact Eng.* **5**, 441–449 (1987)
- G.I. Kerley, Equations of state for calcite materials. I. Theoretical model for dry calcium carbonate. *High Press. Res.* **2**, 29–47 (1988)
- G.I. Kerley, J.L. Wise, Shock-induced vaporization of porous aluminum, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 155–158
- G.I. Kerley, Equations of state and gas-gas separation in soft-sphere mixtures. *J. Chem. Phys.* **91**, 1204–1210 (1989a)
- G.I. Kerley, Theoretical model of explosive detonation products: tests and sensitivity studies, in *Proceedings of 9th International Detonation Symposium*, ONR 113291-7, ed. by J.M. Short, E.L. Lee (Office of Naval Research, Washington, D.C., 1989b), pp. 443–451
- G.I. Kerley, Theory of calcite equation of state, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, J.N. Johnson, L.W. Davison (Elsevier, Amsterdam, 1990), pp. 613–616
- G.I. Kerley, Equations of state for hydrogen and deuterium, SAND2003-3613 (Sandia National Laboratories, Albuquerque, NM, 2003)
- K.Y. Kim, L.C. Chhabildas, A.L. Ruoff, Isothermal equations of state for lithium fluoride. *J. Appl. Phys.* **47**(7), 2862–2866 (1976)
- M.E. Kipp, A.L. Stevens, Numerical integration of a spall-damage viscoplastic constitutive model in a one-dimensional wave propagation code, SAND76-0061 (Sandia National Laboratories, Albuquerque, NM, 1976)
- M.E. Kipp, Calculation of borehole springing in oil shale (Rock Springs Site 6A), SAND77-1501 (Sandia National Laboratories, Albuquerque, NM, 1979)
- M.E. Kipp, J.W. Nunziato, Numerical simulation of detonation failure in nitromethane, in *Proceedings of the 7th International Detonation Symposium*, NSWC MP 82-334, ed. by J.M. Short, S.J. Jacobs (Naval Surface Warfare Center, Dahlgren, VA, 1981), pp. 608–619
- M.E. Kipp, J.W. Nunziato, R.E. Setchell, Hot spot initiation of heterogeneous explosives, in *Proceedings of the 7th International Detonation Symposium*, NSWC MP 82-334, ed. by J.M. Short, S.J. Jacobs (Naval Surface Warfare Center, Dahlgren, VA, 1981), pp. 394–407
- M.E. Kipp, L.W. Davison, Analyses of ductile flow and fracture in two dimensions, in *Shock Waves in Condensed Matter*, ed. by W.J. Nellis, L. Seaman, R.A. Graham. AIP Conference Proceedings, vol. 78 (AIP, College Park, MD, 1982), pp. 442–445
- M.E. Kipp, R.J. Lawrence, WONDY V—A one-dimensional finite-difference wave propagation code, SAND81-0930 (Sandia National Laboratories, Albuquerque, NM, 1982)
- M.E. Kipp, D.E. Grady, Flaw nucleation and energetics of dynamic fragmentation, in *Shock Waves in Condensed Matter*, ed. by J.R. Asay, R.A. Graham, G.K. Straub (Elsevier, Amsterdam, 1983), pp. 159–162
- M.E. Kipp, Modeling granular explosive detonations with shear band concepts, in *Proceedings of 8th International Detonation Symposium*, NSWC MP 86-194, ed. by J.M. Short, W.E. Deal (Naval Surface Warfare Center, Dahlgren, VA, 1985), pp. 35–41
- M.E. Kipp, D.E. Grady, An application of geometric statistics to dynamic fragmentation, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 435–439
- M.E. Kipp, H.J. Melosh, A numerical study of the giant impact origin of the moon: The first half hour. *Lunar Planet Sci.* **18**, 491–492 (1987)
- M.E. Kipp, R.E. Setchell, P.A. Taylor, Homogeneous reactive kinetics applied to granular HNS, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 539–542
- M.E. Kipp, D.E. Grady, J.L. Wise, Planar-shock and penetration response of ceramics, in *Shock-Wave and High-Strain-Rate Phenomena in Materials*, ed. by M.A. Meyers, L.E. Murr, K.P. Staudhammer (Marcel Dekker, New York, NY, 1992), pp. 1083–1091
- M.E. Kipp, D.E. Grady, J.W. Swegle, Numerical and experimental studies of high-velocity impact fragmentation. *Int. J. Impact Eng.* **14**, 427–438 (1993)
- M.E. Kipp, Target response to debris cloud incidence, in *High-Pressure Science and Technology*, ed. by S.C. Schmidt, J.W. Shaner, G.A. Samara, M. Ross, AIP Conference Proceedings, vol. 309 (AIP, College Park, MD, 1994), pp. 1849–1852

- M.E. Kipp, W.D. Reinhart, L.C. Chhabildas, Elastic shock response and spall strength of concrete, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, D.P. Dandekar, J.W. Forbes, AIP Conference Proceedings, vol. 429 (AIP, College Park, MD, 1998), pp. 557–560
- M.E. Kipp, R.R. Martinez, E.S. Hertel, E.L. Baker, B.E. Fuchs, C.L. Chin, Experiments and simulations of spinning shaped charges with fluted liners, in *18th International Symposium on Ballistics*, ed. by W.G. Reinecke, vol. 1 (Technomic Publishing Co, Lancaster, PA, 1999a), pp. 499–506
- M.E. Kipp, R.R. Martinez, R.A. Benham, S.H. Fischer, Explosive containment chamber vulnerability to chemical munition fragment impact, SAND99-0189 (Sandia National Laboratories, Albuquerque, NM, 1999b)
- M.E. Kipp, R.R. Martinez, Assessment of chemical munition fragment impact in an explosive containment chamber, SAND2000-0327 (Sandia National Laboratories, Albuquerque, NM, 2000)
- M.E. Kipp, L.C. Chhabildas, W.D. Reinhart, M.K. Wong, Polyurethane foam impact experiments and simulations, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson, AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 313–316
- L.N. Kmetyk, L.C. Chhabildas, M.B. Boslough, R.J. Lawrence, Effect of phase change in a debris cloud on a backwall structure, in *High-Pressure Science and Technology*, ed. by S.C. Schmidt, J.W. Shaner, G.A. Samara, M. Ross, AIP Conference Proceedings, vol. 309 (AIP, College Park, MD, 1994), pp. 1829–1832
- M.D. Knudson, D.L. Hanson, J.E. Bailey, C.A. Hall, J.R. Asay, W.W. Anderson, Equation of state measurements in liquid deuterium to 70 GPa. *Phys. Rev. Lett.* **87**, 225501 (2001)
- M.D. Knudson, D.L. Hanson, J.E. Bailey, R.W. Lemke, C.A. Hall, C. Deeney, J.R. Asay, Equation of state measurements in liquid deuterium to 100 GPa. *J. Phys. A: Math. Gen.* **36**(22), 6149–6158 (2003a)
- M.D. Knudson, D.L. Hanson, J.E. Bailey, C.A. Hall, J.R. Asay, Use of a wave reverberation technique to infer the density compression of shocked liquid deuterium to 75 GPa. *Phys. Rev. Lett.* **90**(3), 035505 (2003b)
- M.D. Knudson, R.W. Lemke, D.B. Hayes, C.A. Hall, C. Deeney, J.R. Asay, Near-absolute Hugoniot measurements in aluminum to 500 GPa using a magnetically accelerated flyer plate technique. *J. Appl. Phys.* **94**, 4420–4431 (2003c)
- M.D. Knudson, C.A. Hall, R. Lemke, C. Deeney, J.R. Asay, High velocity flyer plate launch capability on the Sandia Z accelerator. *Int. J. Impact Eng.* **29**, 377–384 (2003d)
- M.D. Knudson, D.L. Hanson, J.E. Bailey, C.A. Hall, J.R. Asay, C. Deeney, Principal Hugoniot, reverberating wave, and mechanical reshock measurements of liquid deuterium to 400 GPa using plate impact techniques. *Phys. Rev. B* **69**(14), 144209 (2004)
- M.D. Knudson, J.R. Asay, C. Deeney, Adiabatic release measurements in aluminum from 240- to 500-GPa states on the principal Hugoniot. *J. Appl. Phys.* **97**, 073514 (2005)
- M.D. Knudson, M.P. Desjarlais, D.H. Dolan, Shock-wave exploration of the high-pressure phases of carbon. *Science* **322**, 1822–1825 (2008)
- M.D. Knudson, M.P. Desjarlais, Shock compression of quartz to 1.6 TPa: Redefining a pressure standard. *Phys. Rev. Lett.* **103**, 225501 (2009)
- M.D. Knudson, Megaamps, megagauss, megabars: using the Sandia Z machine to perform extreme material dynamic experiments, in *Shock Compression of Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, J.P. Borg, J.L. Jordan, T.J. Vogler. AIP Conference Proceedings, vol. 1426 (AIP, College Park, MD, 2012), pp. 35–42
- M.D. Knudson, M.P. Desjarlais, R.W. Lemke, T.R. Mattsson, Probing the interiors of the ice giants: Shock compression of water to 700 GPa and 38 g/cc. *Phys Rev Lett* **108**, 091102 (2012)
- M.D. Knudson, M.P. Desjarlais, A. Becker, R.W. Lemke, K.R. Cochrane, M.E. Savage, D.E. Bliss, T.R. Mattsson, R. Redmer, Direct observation of an abrupt insulator-to-metal transition in dense liquid hydrogen. *Science* **348**, 1455–1460 (2015)
- H. Kolsky, An investigation of the mechanical properties of materials at very high rates of loading. *Proc. Phys. Soc. Lond. B* **62**, 676–700 (1949)

- C. Konrad, R. Hollenbach, Techniques for determining velocity and position of small hypervelocity spheres, SAND75-0624 (Sandia National Laboratories, Albuquerque, NM, 1975)
- C. Konrad, R. Moody, Rear surface pin triggering technique, SAND86-0791 (Sandia National Laboratories, Albuquerque, NM, 1986)
- C.H. Konrad, L.C. Chhabildas, M.B. Boslough, A.J. Piekutowski, K.L. Poormon, S.A. Mullin, D.L. Littlefield, Dependence of debris cloud formation on projectile shape, in *High-Pressure Science and Technology*, ed. by S.C. Schmidt, J.W. Shaner, G.A. Samara, M. Ross, AIP Conference Proceedings, vol. 309 (AIP, College Park, MD, 1994), pp. 1845–1848
- C.H. Konrad, W.M. Trott, C.A. Hall, J.S. Lash, R.J. Dukart et al., Use of z-pinch sources for high pressure shock wave experiments, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, D.P. Dandekar, J.W. Forbes, AIP Conference Proceedings, vol. 429 (AIP, College Park, MD, 1998), pp. 997–1000
- C.H. Konrad, W.D. Reinhart, L.C. Chhabildas, G.A. Mann, D.A. Mosher et al., Experimental benchmark data for ALEGRA code calculations, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson, AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 1011–1014
- R.G. Kraus, S. Root, R.W. Lemke, S.T. Stewart, S.B. Jacobsen, T.R. Mattsson, Shock thermodynamics of iron and impact vaporization of planetesimal cores. *Nat. Geosci.* **8**, 269–272 (2015)
- G. Kresse, J. Hafner, *Ab initio* molecular dynamics for liquid metals. *Phys. Rev. B* **47**(1), 558–561 (1993)
- G. Kresse, J. Hafner, *Ab initio* molecular-dynamics simulation of the liquid-metal – Amorphous-semiconductor transition in germanium. *Phys. Rev. B* **49**(20), 14251–14269 (1994)
- G. Kresse, J. Furthmüller, Efficient iterative schemes for *ab initio* total-energy calculations using a plane-wave basis set. *Phys. Rev. B* **54**(16), 11169–11186 (1996)
- R.D. Krieg, J.C. Swearingen, R.W. Rohde, A physically-based internal variable model for rate-dependent plasticity, in *Elastic Behavior of Pressure Vessel and Piping Compounds*, ed. by T.Y. Chang, E. Krempl (Elsevier, Amsterdam, 1978), pp. 15–28
- R.W. Kulterman, F.W. Neilson, W.B. Benedick, Pulse generator based on high shock demagnetization of ferromagnetic material. *J. Appl. Phys.* **29**, 500–501 (1958)
- J.M.D. Lane, G.S. Grest, A.P. Thompson et al., Shock compression of hydrocarbon polymer foam using molecular dynamics, in *Shock Compression of Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, J.P. Borg, J.L. Jordan, T.J. Vogler, AIP Conference Proceedings, vol. 1426 (AIP, College Park, MD, 2012), pp. 1435–1438
- J. Lankford, Mechanisms responsible for strain-rate-dependent compressive strength in ceramic materials. *J. Am. Ceram. Soc.* **64**(2), C33–C34 (1981)
- R.J. Lawrence, WONDY IIIA: A computer program for one-dimensional wave propagation, SC-DR-70-315 (Sandia National Laboratories, Albuquerque, NM, 1970)
- R.J. Lawrence, A nonlinear viscoelastic equation of state for use in stress propagation calculations, SLA-73-0635 (Sandia National Laboratories, Albuquerque, NM, 1973)
- R.J. Lawrence, L.W. Davison, Analysis of nonlinear plane-wave propagation in piezoelectric solids, SAND77-0217 (Sandia National Laboratories, Albuquerque, NM, 1977)
- R.J. Lawrence, J.R. Asay, The high pressure multiple shock response of aluminum, in *High-Pressure Science and Technology Sixth AIRAPT Conference*, ed. by K.D. Timmerhaus, M.S. Barber (Plenum, New York, NY, 1979), pp. 88–98
- R.J. Lawrence, Enhanced momentum transfer from hypervelocity particle impacts. *Int. J. Impact Eng* **10**, 337–349 (1990a)
- R.J. Lawrence, Stand-off shields for hypervelocity particles, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, J.N. Johnson, L.W. Davison (Elsevier, Amsterdam, 1990b), pp. 959–962
- R.J. Lawrence, J.T. Kare, R.M. Zazworsky, D.K. Monroe, System requirements for low earth orbit launch using laser propulsion, in *Proceedings of the 6th International Conference on Emerging Nuclear Energy Systems (ICENES 91)*. *Fusion Technol* **20**, 714–718 (1991)
- R.J. Lawrence, A simple approach for the design and optimization of stand-off hypervelocity particle shields, in *AIAA Space Programs and Technologies Conference (AIAA, Huntsville, AL, 1992a)*, pp. 24–27

- R.J. Lawrence, The equivalence of simple models for radiation-induced impulse, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, R.D. Dick, J.W. Forbes, D.G. Tasker (Elsevier, Amsterdam, 1992b), pp. 785–788
- R.J. Lawrence, W.M. Trott, Theoretical analysis of a pulsed-laser-driven hypervelocity flyer launcher. *Int. J. Impact Eng.* **14**, 439–449 (1993)
- R.J. Lawrence, L.N. Kmetyk, L.C. Chhabildas, The influence of phase changes on debris-cloud interactions with protected structures. *Int. J. Impact Eng.* **17**, 487–496 (1995)
- R.J. Lawrence, J.R. Asay, T.G. Trucano, C. Hall, Analysis of radiation-driven explosive flyers, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson. AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 1079–1082
- R.J. Lawrence, M.D. Furnish, T.A. Haill, T.G. Trucano, T.A. Mehlhorn, K.G. Budge, C.A. Hall, J.R. Asay, K.R. Cochrane, J.J. MacFarlane, Radiation-driven dynamic target response for dissimilar material jetting and for debris effects in partitioned pipes, SAND2001-1688C (Sandia National Laboratories, Albuquerque, NM, 2001) [Presented at III Khariton's Topical Scientific Readings International Conference, Sarov, Russia, February 2001]
- R.J. Lawrence, T.A. Mehlhorn, T.A. Haill et al., Analysis of radiation-driven jetting experiments on Nova and Z, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, N.N. Thadhani, Y. Horie, AIP Conference Proceedings, vol. 620 (AIP, College Park, MD, 2002), pp. 291–294
- R.J. Lawrence, W.D. Reinhart, L.C. Chhabildas, T.F. Thornhill, Spectral measurements of hypervelocity impact flash. *Int. J. Impact Eng.* **33**(1–12), 353–363 (2006)
- R.J. Lawrence, L.C. Chhabildas, Simple models for aspects of IFE shock mitigation. *Fusion Sci. Technol.* **52**(3), 494–498 (2007)
- R.J. Lawrence, J.R. Asay, Y.M. Gupta, C.J. Bakeman, T.A. Haill, Fragment producing chemical-electrical launcher (FP-CEL): Feasibility study (Part I), SAND2008-7999 (Sandia National Laboratories, Albuquerque, NM, 2009a)
- R.J. Lawrence, T.A. Haill, B.L. Freeman, Y.M. Gupta, Fragment producing chemical-electrical launcher (FP-CEL): Numerical analysis (Part II), SAND2008-8000 (Sandia National Laboratories, Albuquerque, NM, 2009b)
- R.J. Lawrence, M.D. Furnish, J.L. Remo, Analytic models for pulsed x-ray impulse coupling, in *Shock Compression of Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, J.P. Borg, J.L. Jordan, T.J. Vogler, AIP Conference Proceedings, vol. 1426 (AIP, College Park, MD, 2012), pp. 883–886
- L.M. Lee, Some dynamic mechanical properties of pyrolytic boron nitride, SC-RR-67-2947 (Sandia National Laboratories, Albuquerque, NM, 1967)
- L.M. Lee, Dynamic compaction of distended isotropic pyrolytic boron nitride, SC-RR-68-2 (Sandia National Laboratories, Albuquerque, NM, 1968)
- L.M. Lee, R.P. May, T.R. Guess, Some dynamic mechanical properties of distended carbons. *AIAA J.* **8**(8), 1421–1428 (1970)
- L.M. Lee, Shock response of distended CVD carbon felt, SC-RR-72-0814 (Sandia National Laboratories, Albuquerque, NM, 1972)
- L.M. Lee, Low stress shock behavior of cellular concrete, SLA-73-0164 (Sandia National Laboratories, Albuquerque, NM, 1973a)
- L.M. Lee, Nonlinearity in the piezoresistance coefficient of impact-loaded manganin. *J. Appl. Phys.* **44**(9), 4017–4022 (1973b)
- L.M. Lee, Shock-induced index-of-refraction variations in PMMA, sapphire and lithium fluoride. Ktech Corporation Technical Report No. TR76-04 (Ktech Corporation, Albuquerque, NM, 1976)
- L.M. Lee, A.C. Schwarz, Shock characterization of hexanitroazobenzene (HNAB), in *Proceedings of the 7th International Detonation Symposium*, NSWC MP 82-334, ed. by J.M. Short, S.J. Jacobs (Naval Surface Warfare Center, Dahlgren, VA, 1982), pp. 416–424
- L.M. Lee, W.D. Williams, R.A. Graham, F. Bauer, Studies of the Bauer piezoelectric polymer gauge (PVDF) under impact loading, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 497–502

- L.M. Lee, R.A. Graham, F. Bauer, R.P. Reed, Standardized Bauer PVDF piezoelectric polymer shock gauge. *J Phys Colloques* **49**(C3), 651–657 (1988)
- L.M. Lee, D.A. Hyndman, R.P. Reed, F. Bauer, PVDF applications in shock measurements, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, J.N. Johnson, L.W. Davison (Elsevier, Amsterdam, 1990), pp. 821–824
- L.M. Lee, D.E. Johnson, F. Bauer, R.P. Reed, J.I. Greenwell, Piezoelectric polymer PVDF application under soft x-ray induced shock loading, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, R.D. Dick, J.W. Forbes, D.G. Tasker (Elsevier, Amsterdam, 1992), pp. 879–882
- L.M. Lee, S.T. Montgomery, P.H. Jilbert, Multi-element quartz shock gauge development, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson, AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 1015–1018
- Y.K. Lee, F.L. Williams, R.A. Graham, B. Morosin, Specific surface measurements of shock modified powders, in *Shock Waves in Condensed Matter*, ed. by J.R. Asay, R.A. Graham, G.K. Straub (Elsevier, Amsterdam, 1984), pp. 399–402
- Y.T. Lee, R.M. More, An electron conductivity model for dense plasmas. *Phys. Fluids* **27**(5), 1273–1286 (1984)
- R.W. Lemke, M.D. Knudson, A.C. Robinson, T.A. Haill, K.W. Struve et al., Considerations for generating up to 10 Mbar magnetic drive pressures with the refurbished Z machine (ZR), in *Shock Waves in Condensed Matter*, ed. by M.D. Furnish, N.N. Thadhani, Y. Horie, AIP Conference Proceedings, vol. 651 (AIP, College Park, MD, 2002), pp. 299–302
- R.W. Lemke, M.D. Knudson, C.A. Hall, T.A. Haill, M.P. Desjarlais et al., Characterization of magnetically accelerated flyer plates. *Phys. Plasmas* **10**, 1092–1099 (2003a)
- R.W. Lemke, M.D. Knudson, A.C. Robinson et al., Self-consistent, two-dimensional magneto-hydrodynamic simulations of magnetically driven flyer plates. *Phys. Plasmas* **10**(5), 1867–1874 (2003b)
- R.W. Lemke, M.D. Knudson, J.-P. Davis, D. Bliss, H.C. Harjes, Self-consistent, 2D magneto-hydrodynamic simulations of magnetically driven flyer plate experiments on the Z-machine, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, Y.M. Gupta, J.W. Forbes, AIP Conference Proceedings, vol. 706 (AIP, College Park, MD, 2004), pp. 1175–1180
- R.W. Lemke, M.D. Knudson, D.E. Bliss, K. Cochrane, J.-P. Davis, A.A. Giunta, H.C. Harjes, S.A. Slutz, Magnetically accelerated, ultrahigh velocity flyer plates for shock wave experiments. *J. Appl. Phys.* **98**, 073530 (2005)
- R.W. Lemke, D.B. Sinars, E.M. Waisman, M.E. Cuneo et al., Effects of mass ablation on the scaling of x-ray power with current in wire-array z pinches. *Phys. Rev. Lett.* **102**, 025005 (2009)
- R.W. Lemke, M.D. Knudson, J.-P. Davis, Magnetically driven hyper-velocity launch capability at the Sandia Z accelerator. *J. Impact Eng.* **38**, 480–485 (2011)
- R.W. Lemke, M.R. Martin, R.D. McBride et al., Determination of pressure and density of shocklessly compressed beryllium from x-ray radiography of a magnetically driven cylindrical liner implosion, in *Shock Compression of Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, J.P. Borg, J.L. Jordan, T.J. Vogler, AIP Conference Proceedings, vol. 1426 (AIP, College Park, MD, 2012), pp. 473–476
- R.W. Lemke, M.D. Knudson, K. Cochrane, M.P. Desjarlais, J.R. Asay, On the scaling of the magnetically accelerated flyer plate technique to currents greater than 20 MA, in *18th American Physical Society Shock Compression in Condensed Matter and 24th International Association for the Advancement of High Pressure Science and Technology Conference*, ed. by W. Buttler, M. Furlanetto, W. Evans, Journal of Physics Conference Series, vol. 500 (IOP Publishing, Bristol, 2014), 152009
- J.F. Leon, R.B. Spielman, J.R. Asay, C.A. Hall, W.A. Stygar, P. L'eplattennier, Flux compression experiments on the Z Accelerator, in *Proceedings 12th IEEE International Pulsed Power Conference*, Vol. 1 (IEEE, Piscataway, NJ, 1999), pp. 275–278
- H.E. Lindberg, A.L. Florence, Dynamic pulse buckling – Theory and experiment, DNA 6503H (Defense Nuclear Agency, Washington, DC, 1983) [Both Martinus Nijhoff Pubs., Dordrecht,

- The Netherlands and Springer (in English) published versions of Lindberg and Florence's book in 1987]
- J. Lipkin, M.E. Kipp, Wave structure measurement and analysis in hypervelocity impact experiments. *J. Appl. Phys.* **47**(5), 1979–1986 (1976)
- J. Lipkin, J.R. Asay, Reshock and release of shock-compressed 6061-T6 aluminum. *J. Appl. Phys.* **48**, 182–189 (1977)
- W. Lorenzen, B. Holst, R. Redmer, Metallization in hydrogen-helium mixtures. *Phys. Rev. B* **84**, 235109 (2011)
- P. Loubeyre, S. Brygoo, J. Eggert, P.M. Celliers, D.K. Spaulding, J.R. Rygg, T.R. Boehly, G.W. Collins, R. Jeanloz, Extended data set for the equation of state of warm dense hydrogen isotopes. *Phys. Rev. B* **86**, 144115 (2012)
- C.D. Lundergan, Contact fuzing study – First report, SC-TM-141-57 (12) (Sandia National Laboratories, Albuquerque, NM, 1957)
- C.D. Lundergan, A method for measuring (1) the parameter of impact between two surfaces and (2) the properties of the plane shock waves produced, SC-4421 (Sandia National Laboratories, Albuquerque, NM, 1960)
- C.D. Lundergan, The Hugoniot equation of state of 6061-T6 aluminum at low pressures, SC-4637 (RR) (Sandia National Laboratories, Albuquerque, NM, 1961)
- C.D. Lundergan, J.H. Smith, Method of determining spall thresholds using one-dimensional shock waves, SC-DC-2629 (Sandia National Laboratories, Albuquerque, NM, 1962)
- C.D. Lundergan, Spall Fracture, in *Proceedings of Symposium on Structural Dynamics under High Impulse Loading*, ASD-TDR-63-140 (Wright-Patterson Air Force Base, Dayton, OH, 1963), pp. 357–381
- C.D. Lundergan, W. Herrmann, Equation of state of 6061-T6 aluminum at low pressures. *J. Appl. Phys.* **34**(7), 2046–2052 (1963)
- C.D. Lundergan, Discussion of the transmitted waveforms in a periodic laminated composite. *J. Appl. Phys.* **42**(11), 4148–4155 (1970)
- C.D. Lundergan, D.S. Drumheller, Dispersion of shock waves in composite materials, in *Shock Waves and the Mechanical Properties of Solids* (Proceedings of 17th Sagamore Army Materials Research Center Conference), ed. by J.J. Burke, V. Weiss (Syracuse University Press, Syracuse, NY, 1971a), Vol. 17, pp. 141–145
- C.D. Lundergan, D.S. Drumheller, Propagation of stress waves in a laminated plate composite. *J. Appl. Phys.* **42**, 669–675 (1971b)
- C.D. Lundergan, D.S. Drumheller, Propagation of transient stress pulses in an obliquely laminated composite, in *Dynamics of Composite Materials* (Proceedings of Applied Mechanics Division of the ASME), ed. by E.H. Lee (Springer, New York, NY, 1972), pp. 35–47
- P.C. Lysne, W.J. Halpin, Shock compression of porous iron in the region of incomplete compaction. *J. Appl. Phys.* **39**, 5488–5495 (1968)
- P.C. Lysne, R.R. Boade, C.M. Percival, O.E. Jones, Determination of release adiabats and recentered Hugoniot curves by shock reverberation techniques. *J. Appl. Phys.* **40**, 3786–3795 (1969)
- P.C. Lysne, A comparison of calculated and measured low-stress Hugoniots and release adiabats of dry and water-saturated tuff. *J. Geophys. Res.* **75**, 4375–4386 (1970)
- P.C. Lysne, Determination of high pressure equations of state by shock loading porous specimens. *J. Appl. Phys.* **42**, 2152–2153 (1971a)
- P.C. Lysne, Equation of state of liquid CCl₄ to 16 kbar: A comparison of shock and static experiments. *J. Chem. Phys.* **55**, 5242–5246 (1971b)
- P.C. Lysne, Nonlinear U(u) Hugoniots of liquids at low pressures. *J. Chem. Phys.* **57**, 492–494 (1972a)
- P.C. Lysne, One-dimensional theory of polarization by shock waves: Application to quartz gauges. *J. Appl. Phys.* **43**, 425–431 (1972b)
- P.C. Lysne, Dielectric breakdown of shock-loaded PZT 65/35. *J. Appl. Phys.* **44**, 577–582 (1973)
- P.C. Lysne, D.R. Hardesty, Fundamental equation of state of liquid nitromethane to 100 kbar. *J. Chem. Phys.* **59**(12), 6512–6523 (1973)

- P.C. Lysne, Prediction of dielectric breakdown in shock-loaded ferroelectric ceramics. *J. Appl. Phys.* **46**, 230–232 (1975)
- P.C. Lysne, L.C. Bartel, Electromechanical response of PZT 65/35 subjected to axial shock loading. *J. Appl. Phys.* **46**, 222–229 (1975)
- P.C. Lysne, C.M. Percival, Electric energy generation by shock compression of ferroelectric ceramics: Normal mode response of PZT 95/5. *J. Appl. Phys.* **46**, 1519–1525 (1975)
- P.C. Lysne, Dielectric properties of shock wave compressed PZT 95/5. *J. Appl. Phys.* **48**, 1020–1023 (1976)
- P.C. Lysne, C.M. Percival, Analysis of shock-wave-actuated ferroelectric power supplies. *Ferroelectrics* **10**, 129–133 (1976)
- P.C. Lysne, Shock-induced polarization of a ferroelectric ceramic. *J. Appl. Phys.* **48**, 1024–1031 (1977)
- P.C. Lysne, Dielectric properties of shock wave compressed PMMA and an alumina-loaded epoxy. *J. Appl. Phys.* **49**, 4186–4190 (1978a)
- P.C. Lysne, Electrical response of relaxing dielectrics compressed by shock waves: The axial-mode problem. *J. Appl. Phys.* **49**, 4180–4185 (1978b)
- P.C. Lysne, Dielectric relaxation in insulators slightly damaged by stress pulses. *J. Appl. Phys.* **54**, 3160–3165 (1983)
- G.A. Lyzenga, T.J. Ahrens, Multi-wavelength optical pyrometer for shock compression experiments. *Rev. Sci. Instrum.* **50**, 1421–1424 (1979)
- R.J. Magyar, S.S. Root, T.A. Haill et al., Equations of state of mixtures: Density functional theory (DFT): Simulations and experiments on Sandia's Z machine, in *Shock Compression of Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, J.P. Borg, J.L. Jordan, T.J. Vogler, AIP Conference Proceedings, vol. 1426 (AIP, College Park, MD, 2012), pp. 1195–1198
- M.R. Martin, R.W. Lemke, R.D. McBride et al., Analysis of cylindrical ramp compression experiment with radiography based surface fitting method, in *Shock Compression of Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, J.P. Borg, J.L. Jordan, T.J. Vogler, AIP Conference Proceedings, vol. 1426 (AIP, College Park, MD, 2012), pp. 357–360
- A.R. Mathews, R.H. Warnes, G.R. Whittemore, W.F. Hemsing, VISAR line-imaging interferometer. *SPIE Proc. No. 1346*, 133–140 (1990)
- T.R. Mattsson, J.M.D. Lane, K.R. Cochrane, M.P. Desjarlais, A.P. Thompson, F. Pierce, G.S. Grest, First principles and classical molecular dynamics simulation of shocked polymers. *Phys. Rev. B* **81**, 054103 (2010)
- T.R. Mattsson, S. Root, A.E. Mattsson, L. Shulenburger, R.J. Magyar, D.G. Flicker, Validating density functional theory (DFT) simulations at high energy-density conditions with liquid krypton shock experiments to 850 GPa on Sandia's Z machine. *Phys. Rev. B* **90**, 184105 (2014)
- S. Mazevet, M.P. Desjarlais, L.A. Collins et al., Simulations of the optical properties of warm dense aluminum. *Phys. Rev. E* **71**, 016409 (2005)
- J.M. McAfee, B.W. Asay et al., Deflagration to detonation in granular HMX, in *Proceedings of the Ninth International Detonation Symposium*, ONR 113291-7, ed. by J.M. Short, E.L. Lee (Office of Naval Research, Washington, D.C., 1991), pp. 265–279
- J.M. McGlaun, S.L. Thompson, J.R. Freeman, COMAG-III: A 2-D MHD code for helical CMF generators, in *Megagauss Physics and Technology*, ed. by P.J. Turchi (Plenum, New York, NY, 1980), pp. 193–203
- J.M. McGlaun, Crater: A computer code for calculating late stage crater formation, SAND80-1694 (Sandia National Laboratories, Albuquerque, NM, 1981a)
- J.M. McGlaun, New features and revised input instructions for CHARTD, SAND81-2581 (Sandia National Laboratories, Albuquerque, NM, 1981b)
- J.M. McGlaun, Improvements in CSQII: A transmitting boundary condition, SAND82-1248 (Sandia National Laboratories, Albuquerque, NM, 1982)
- J.M. McGlaun, S.L. Thompson, M.G. Elrick, CTH: A three-dimensional shock wave physics code. *Int. J. Impact Eng.* **10**, 351–360 (1990)
- J.M. McGlaun, J.S. Peery, E.S. Hertel, Shock physics code research at Sandia National Laboratories: Massively parallel computers and advanced algorithms, SAND96-0431C (Sandia National Laboratories, Albuquerque, NM, 1996)

- J.M. McMahon, M.A. Morales, C. Pierleoni, D.M. Ceperley, The properties of hydrogen and helium under extreme conditions. *Rev. Modern Phys.* **84**, 1607–1653 (2012)
- T.E. Michaels, Orientation dependence of elastic precursor delay in single crystal tungsten, Ph.D. thesis, Physics Department, Washington State University, Pullman, WA, 1972
- J.M. Miller, L.C. Chhabildas, Low temperature experimental capability for use with gas guns, SAND85-0303 (Sandia National Laboratories, Albuquerque, NM, 1985)
- J.C.F. Millet, D. Deas, N.K. Bourne, S.T. Montgomery, The deviatoric response of an alumina filled epoxy composite during shock loading. *Appl. Phys.* **102**, 063518 (2007)
- S.T. Montgomery, Computer simulations of 75-mm projectiles impacting sand targets, SAND82-0831 (Sandia National Laboratories, Albuquerque, NM, 1982)
- S.T. Montgomery, Creep closure of an opening in a deep potash mine, in *Recent Advances in Engineering Mechanics and Their Impact on Civil Engineering Practice*, ed. by W.F. Chen, A.D.M. Lewis, vol. 2 (American Society of Civil Engineers, New York, NY, 1983), pp. 1024–1027
- S.T. Montgomery, Analysis of transitions between ferroelectric and antiferroelectric states under conditions of uniaxial strain, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 179–184
- S.T. Montgomery, P.F. Chavez, Basic equations and solution method for the calculation of the transient electromechanical response of dielectric devices, SAND86-0755 (Sandia National Laboratories, Albuquerque, NM, 1986)
- S.T. Montgomery, P.J. Chen, Influences of domain switching and dipole dynamics on the normal mode responses of a ferroelectric ceramic bar. *Int. J. Solids Struct.* **22**(11), 1293–1305 (1986)
- S.T. Montgomery, R. A. Graham, F. Bauer, H. Moulard, Copolymer shock gauge response investigation with the fully coupled electromechanical code, SUBWAY, in *Proceedings of the Workshop on the Technology of Ferroelectric Polymers* (1995), pp. 412–431.
- S.T. Montgomery, R.A. Graham, M.U. Anderson, Return to the shorted and shunted quartz gauge problem: Analysis with the SUBWAY code, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, W.C. Tao, AIP Conference Proceedings, vol. 370 (AIP, College Park, MD, 1996), pp. 1025–1028
- S.T. Montgomery, R.M. Brannon, J. Robbins, R.E. Setchell, D.H. Zeuch, Simulation of the effects of shock stress and electrical field strength on shock-induced depoling of normally poled PZT 95/5, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, N.N. Thadhani, Y.M. Horie, AIP Conference Proceedings, vol. 620 (AIP, College Park, MD, 2002), pp. 201–204
- S.T. Montgomery, D.H. Zeuch, Mechanical properties of engineering ceramics, composites and aerospace materials – A model for the bulk mechanical response of porous ceramics exhibiting a ferroelectric-to-antiferroelectric phase transition during hydrostatic compression, in *Ceramic Engineering and Science Proceedings*, Vol. 25, ed. by E. Lara-Curzio, M.J. Readey (The American Ceramic Society, Westerville, OH, 2004), pp. 313–318
- S.T. Montgomery, Effects of porosity and pore morphology on the elastic properties of unpoled PZT 95/5-2Nb, SAND2008-6185 (Sandia National Laboratories, Albuquerque, NM, 2008)
- S.T. Montgomery, Effects of composition on the mechanical response of alumina filled epoxy, SAND2009-6399 (Sandia National Laboratories, Albuquerque, NM, 2009)
- R. Moody, C. Konrad, Magnetic induction system for two-stage gun projectile velocity measurements, SAND84-0638 (Sandia National Laboratories, Albuquerque, NM, 1984)
- L.M. Moore, R.A. Graham, R.P. Reed, L.M. Lee, F. Bauer, T.W. Warren, Standardized piezoelectric polymer (PVDF) gauge for detonator response measurements, in *Behaviour of Dense Media Under High Dynamic Pressures* (Association Francaise de Pyrotechnie, Paris, 1989), pp. 35–43
- L.M. Moore, R.A. Graham, Response of standardized PVDF piezoelectric polymer gauges to direct shock pressures between 8 and 32 GPa, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, J.N. Johnson, L.W. Davison (Elsevier, Amsterdam, 1990), pp. 813–816

- B. Morosin, R.A. Graham, X-ray diffraction line broadening studies on shock-loaded TiO_2 and Al_2O_3 , in *Shock Waves in Condensed Matter*, ed. by J.R. Asay, R.A. Graham, G.K. Straub (Elsevier, Amsterdam, 1984), pp. 355–362
- B. Morosin, R.A. Graham, J.R. Hellmann, Monoclinic to tetragonal conversion of zirconia under shock compression, in *Shock Waves in Condensed Matter*, ed. by J.R. Asay, R.A. Graham, G.K. Straub (Elsevier, Amsterdam, 1984), pp. 383–386
- B. Morosin, R.A. Graham, X-ray diffraction studies on shock-modified materials, in *Metallurgical Applications of Shock-Wave and High-Strain-Rate Phenomena*, ed. by L.E. Murr, K.P. Staudhammer, M.A. Meyers (Marcel Dekker, New York, NY, 1986), pp. 1037–1047
- B. Morosin, E.L. Venturini, R.A. Graham, X-ray diffraction studies of shock-synthesized zinc ferrite, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 797–802
- B. Morosin, R.A. Graham, E.L. Venturini, D.S. Ginley, Shock-induced chemical synthesis of phases similar to the high temperature superconductor oxides, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988a), pp. 439–442
- B. Morosin, R.A. Graham, E.L. Venturini, M.J. Carr, D.L. Williamson, Shock-induced chemical synthesis of barium ferrites, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988b), pp. 435–438
- B. Morosin, R.A. Graham, S.S. Pollack, X-ray diffraction line broadening, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, R.D. Dick, J.W. Forbes, D.G. Tasker (Elsevier, Amsterdam, 1992), pp. 613–616
- S.A. Mullin, D.L. Littlefield, L.C. Chhabildas, A.J. Piekutowski, Computational simulations of experimental impact data obtained at 7 to 11 km/s with aluminum and zinc, in *High-Pressure Science and Technology*, ed. by S.C. Schmidt, J.W. Shaner, G.A. Samara, M. Ross, AIP Conference Proceedings, vol. 309 (AIP, College Park, MD, 1994), pp. 1817–1820
- D.E. Munson, L.M. Barker, Dynamically determined pressure-volume relationships for aluminum, copper, and lead. *J. Appl. Phys.* **37**(4), 1652–1660 (1966)
- D.E. Munson, K.W. Schuler, Hugoniot predictions for mechanical mixtures using effective moduli, in *Shock Waves and the Mechanical Properties of Solids*, ed. by J. Burke, V. Weiss (Syracuse University Press, Syracuse, NY, 1971), pp. 185–201
- D. Munson, R. May, Interior ballistics of a two-stage light gas gun, SAND75-0323 (Sandia National Laboratories, Albuquerque, NM, 1975)
- D.E. Munson, R.R. Boade, K.W. Schuler, Stress wave propagation in Al_2O_3 -epoxy mixtures. *J. Appl. Phys.* **49**, 4797–4807 (1977)
- D.L. Munson, R.J. Lawrence, Dynamic deformation of polycrystalline alumina. *J. Appl. Phys.* **50**(10), 6272–6282 (1979)
- S.A. Myers, C.C. Koch, Y. Horie, R.A. Graham, TEM of nickel aluminides produced by shock compaction, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 755–759
- F.W. Neilson, W.B. Benedick, The piezoelectric response of quartz beyond its Hugoniot elastic limit. *Bull. Am. Phys. Soc. Ser. II* **5**(7), 511 (1960)
- F.W. Neilson, W.B. Benedick, W.P. Brooks, R.A. Graham, G.W. Anderson, Electrical and optical effects of shock waves in crystalline quartz, in *Les Ondes de Detonation*, ed. by G. Ribaud (Centre National de la Recherche Scientifique, Paris, 1962), pp. 391–419
- W.J. Nellis, Metastable solid metallic hydrogen. *Philos. Mag.* **79**(4), 655–661 (1999)
- W.J. Nellis, S.T. Weir, A.C. Mitchell, Minimum metallic conductivity of fluid hydrogen at 140 GPa (1.4 Mbar). *Phys. Rev. B* **59**(5), 3434–3449 (1999)
- W.J. Nellis, Metastable metallic hydrogen glass, UCRL-JC-142360 (Lawrence Livermore National Laboratory, Livermore, CA, 2001)
- W.J. Nellis, Wigner and Huntington: The long quest for metallic hydrogen. *High Press. Res.* **33**(2), 369–376 (2013)
- T.V. Nordstrom, R.W. Rohde, D.J. Mottern, Explosive strengthening of a Cu-Be alloy. *Metall. Trans.* **6**, 1561–1568 (1975)

- F.R. Norwood, R.A. Graham, A. Sawaoka, Numerical simulation of a sample recovery fixture for high velocity impact, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 837–842
- J.W. Nunziato, W. Herrmann, The general theory of shock waves in elastic nonconductors. *Arch. Ration. Mech. Anal.* **47**, 272–287 (1972)
- J.W. Nunziato, K.W. Schuler, E.K. Walsh, The bulk response of viscoelastic solids. *Trans. Soc. Rheol.* **16**, 15–32 (1972)
- J.W. Nunziato, K.W. Schuler, Evolution of steady shock waves in polymethyl methacrylate. *J. Appl. Phys.* **44**, 4774–4775 (1973a)
- J.W. Nunziato, K.W. Schuler, Shock pulse attenuation in a nonlinear viscoelastic solid. *J. Mech. Phys. Solids* **21**, 447–457 (1973b)
- J.W. Nunziato, K.W. Schuler, D.B. Hayes, Wave propagation calculations for nonlinear viscoelastic solids, in *Computational Methods in Nonlinear Mechanics*, ed. by J.T. Oden et al. (The Texas Institute for Computational Mechanics, Austin, TX, 1974a), pp. 489–498
- J.W. Nunziato, E.K. Walsh, K.W. Schuler, L.M. Barker, Wave propagation in non-linear viscoelastic solids, in *Mechanics of Solids*, ed. by C. Truesdell (Springer, Berlin, 1974b), pp. 1–108 [The second edition was published in 1984 by Springer, New York, NY]
- J.W. Nunziato, Acceleration waves in elastic materials with two temperatures. *Int. J. Nonlinear Mech.* **10**, 137–142 (1975)
- J.W. Nunziato, K.W. Schuler, E.K. Walsh, The influence of precompression on acceleration wave propagation in a nonlinear viscoelastic material. *J. Appl. Mech.* **42**, 731–732 (1975)
- J.W. Nunziato, J.E. Kennedy, Shock-wave evolution in a chemically reacting solid. *J. Mech. Phys. Solids* **24**, 107–124 (1976)
- J.W. Nunziato, J.E. Kennedy, D.E. Amos, The thermal ignition time for homogeneous explosives involving two parallel reactions. *Combust. Flame* **43**, 265–268 (1977)
- J.W. Nunziato, D.S. Drumheller, The thermodynamics of Maxwellian materials. *Int. J. Solids Struct.* **14**, 545–558 (1978)
- J.W. Nunziato, E.K. Walsh, J.E. Kennedy, A continuum model for hot-spot initiation of granular explosives, in *Behaviour of Dense Media under High Dynamic Pressures* (CEA, Paris, 1978a), pp. 139–148
- J.W. Nunziato, E.K. Walsh, J.E. Kennedy, Behavior of one-dimensional acceleration waves in an inhomogeneous granular solid. *Int. J. Eng. Sci.* **16**, 637–648 (1978b)
- J.W. Nunziato, M.E. Kipp, Numerical studies of initiation, detonation, and detonation failure in nitromethane, SAND81-0669 (Sandia National Laboratories, Albuquerque, NM, 1983)
- J.W. Nunziato, Initiation and growth-to-detonation in reactive mixtures, in *Shock Compression of Condensed Matter*, ed. by J.R. Asay, R.A. Graham, G.K. Straub (Elsevier, Amsterdam, 1984), pp. 581–588
- B.V. Oliver, Non-ideal MHD plasma regimes and their relevance to the study of dynamic z-pinches, MRC/ABQ-R-1947 (Mission Research Corporation, Albuquerque, NM, 1999)
- D.L. Paisley, Laser-driven miniature flyer plates for shock initiation of secondary explosives, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, J.N. Johnson, L.W. Davison (Elsevier, Amsterdam, 1990), pp. 733–736
- H.R. Pak, Y. Horie, R.A. Graham, Synthesis of nickel-aluminum alloys by shock compression of composite particles, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 761–766
- H.S. Park, N.R. Barton, J.L. Belof, K.J.M. Blobaum, R.M. Cavallo et al., Experimental results of tantalum material strength at high pressure and high strain rate, in *Shock Compression of Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, J.P. Borg, J.L. Jordan, T.J. Vogler, AIP Conference Proceedings, vol. 1426 (AIP, College Park, MD, 2012), pp. 1371–1374
- S.L. Passman, J.W. Nunziato, P.B. Bailey, E.K. Walsh, A mixture theory for suspensions, in *Rheology*, ed. by G. Astarita, G. Marrucci, L. Nicolais (Plenum, New York, NY, 1980), Vol. 2: Fluids, pp. 583–589
- S.L. Passman, J.W. Nunziato, Shearing flow of a fluid-saturated granular material, in *Mechanics of Structured Media*, ed. by A.P.S. Selvadurai (Elsevier, Amsterdam, 1981), pp. 343–353

- L.E. Pope, L.R. Edwards, The pressure dependence of the austenite start temperature in iron-nickel base alloys. *Acta Metall.* **21**, 281–288 (1973)
- L.E. Pope, A.L. Stevens, Wave propagation in beryllium single crystals, in *Metallurgical Effects at High Strain Rates*, ed. by R.W. Rohde, B.M. Butcher, J.R. Holland, C.H. Karnes (Plenum, New York, NY, 1973), pp. 349–366
- L.E. Pope, J.N. Johnson, Shock-wave compression of single-crystal beryllium. *J. Appl. Phys.* **46**(2), 720–729 (1975)
- D.L. Preston, D.L. Tonks, D.C. Wallace, Model of plastic deformation for extreme loading conditions. *J. Appl. Phys.* **93**, 211–220 (2003)
- G.F. Raiser, J.L. Wise, R.J. Clifton, D.E. Grady, D.E. Cox, Plate impact response of ceramics and glasses. *J. Appl. Phys.* **75**(8), 3862–3869 (1994)
- R.P. Reed, Stress pulse-trains from multiple reflections at zone of many discontinuities. A notation for machine solution, SC-4462 (RR) (Sandia National Laboratories, Albuquerque, NM, 1962)
- R.P. Reed, D.M. Schuster, Filament fracture and post-impact strength of boron-aluminum composites. *J. Compos. Mater.* **4**, 514–525 (1970)
- R.P. Reed, D.E. Munson, Stress pulse attenuation in cloth-laminate quartz phenolic. *J. Compos. Mater.* **6**(2), 232–257 (1972)
- R.P. Reed, J.I. Greenwoll, The PVDF piezoelectric polymer shock-stress sensor, SAND88-2907 (Sandia National Laboratories, Albuquerque, NM, 1989)
- R.P. Reed, R.A. Graham, L.M. Moore, L.M. Lee, D.J. Fogelson, F. Bauer, The Sandia standard for PVDF shock sensors, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, J.N. Johnson, L.W. Davison (Elsevier, Amsterdam, 1990), pp. 825–828
- W.D. Reinhart, L.C. Chhabildas, W.M. Trott, D.P. Dandekar, Investigating multi-dimensional effects in single crystal sapphire, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, N.N. Thadhani, Y. Horie, AIP Conference Proceedings, vol. 620 (AIP, College Park, MD, 2002), pp. 791–794
- W.D. Reinhart, L.C. Chhabildas, Strength properties of Coors AD995 alumina in the shocked state. *Int. J. Impact Eng.* **29**, 601–619 (2003)
- W.D. Reinhart, L.C. Chhabildas, T.J. Vogler, Investigating phase transitions and strength in single crystal sapphire using shock-reshock loading techniques. *Int. J. Impact Eng.* **33**, 655–669 (2006)
- W.D. Reinhart, T.J. Vogler, L.C. Chhabildas, Strength measurements on dry Indiana limestone using ramp loading techniques, in *Shock Compression of Condensed Matter*, ed. by M. Elert, M.D. Furnish, R. Chau, N. Holmes, J. Nguyen, AIP Conference Proceedings, vol. 955 (AIP, College Park, MD, 2007), pp. 1409–1412
- W.D. Reinhart, T.F. Thornhill, L.C. Chhabildas, W.G. Breiland, J.L. Brown, Temperature measurements of expansion products from shock compressed materials using high-speed spectroscopy. *Int. J. Impact Eng.* **35**, 1745–1755 (2008)
- D.B. Reisman, A. Toor, R.C. Cauble, C.A. Hall, J.R. Asay, M.D. Knudson, M.D. Furnish, Magnetically driven isentropic compression experiments on the Z accelerator. *J. Appl. Phys.* **89**(3), 1625–1633 (2001a)
- D.B. Reisman, J.W. Forbes, C.M. Tarver, F. Garcia, D.B. Hayes, M.D. Furnish, J.J. Dick, Isentropic compression of high explosives with the Z accelerator, in *Proceedings of the 12th International Detonation Symposium*, ONR Report 333-05-2, ed. by J.M. Short, J.L. Maienschein (Office of Naval Research, Washington, DC, 2001b), pp. 343–348
- J.L. Remo, M.D. Furnish, R.J. Lawrence, Plasma-driven z-pinch x-ray loading and momentum coupling in meteorite and planetary materials. *J. Plasma Phys.* **29**(2), 121–141 (2013)
- A.M. Renlund, W.M. Trott, Spectrographic studies of shocked and detonating explosives, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, New York, NY, 1988), pp. 547–552
- A.M. Renlund, P.L. Stanton, W.M. Trott, Laser initiation of secondary explosives, in *Proceedings of the 9th International Detonation Symposium*, ONR 113291-7, ed. by J.M. Short, E.L. Lee (Office of Naval Research, Washington, DC, 1989), pp. 1118–1127

- A.M. Renlund, W.M. Trott, Raman spectroscopic studies of shock-compressed nitromethane-d₃, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, J.N. Johnson, L.W. Davison (Elsevier, New York, NY, 1990), pp. 875–878
- P.A. Rigg, M.D. Knudson, R.J. Scharff, R.S. Hixson, Determining the refractive index of shocked [100] lithium fluoride to the limit of transmissibility. *J. Appl. Phys.* **116**, 033515 (2014)
- A.C. Robinson, T.A. Brunner, S.K. Carroll, R.R. Drake et al., ALEGRA: An Arbitrary Lagrangian-Eulerian multimaterial, multiphysics code, in *Proceedings of the 46th AIAA Aerospace Science Meeting and Exhibit*, AIAA 2008–1235 (AIAA, Huntsville, AL, 2008)
- A.C. Robinson, J.H.J. Niederhaus, V.G. Weirs, E. Love, Arbitrary Lagrangian–Eulerian 3D ideal MHD algorithms. *Int. J. Num. Meth. Fluids* **65**, 1438–1450 (2011)
- R.W. Rohde, O.E. Jones, Mechanical and piezoelectric properties of shock-loaded X-cut quartz at 573 degrees K. *Rev. Sci. Instrum.* **39**(3), 313–316 (1968)
- R.W. Rohde, J.R. Holland, R.A. Graham, Shock-wave-induced reverse martensitic transformation in Fe-30 pct Ni. *Trans. Metall. Soc. AIME* **242**, 2017–2019 (1968)
- R.W. Rohde, Dynamic yield behavior of shock-loaded iron from 76 to 573 degrees K. *Acta Metall.* **17**, 353–363 (1969)
- R.W. Rohde, R.A. Graham, The effect of hydrostatic pressure on the martensitic reversal of an iron-nickel-carbon alloy. *Trans. Metall. Soc. AIME* **245**, 2441–2445 (1969)
- R.W. Rohde, Temperature dependence of the shock-induced reversal of martensite to austenite in an iron-nickel-carbon alloy. *Acta Metall.* **18**, 903–913 (1970)
- R.W. Rohde, C.E. Albright, The influence of uniaxial tensile stress upon the austenite start temperature of an iron nickel carbon alloy. *Scrip. Metall.* **5**(2), 151–154 (1971)
- R.W. Rohde, W.C. Leslie, R.C. Glenn, The dynamic yield behavior of annealed and cold-worked Fe-0.17 pct Ti alloy. *Metallurgical Trans.* **3**, 323–328 (1972)
- R.W. Rohde, R.A. Graham, Stability of the magnetic phase transformation in shocked Fe-Ni alloys. *Philos. Mag.* **28**, 941–943 (1973)
- R.W. Rohde, J.L. Wise, J.G. Byrne, S. Panchanadeeswaran, Microstructural-hardness correlations in shock-loaded and quasi-statically deformed 6061-T6 aluminum, in *Shock Waves in Condensed Matter*, ed. by J.R. Asay, R.A. Graham, G.K. Straub (Elsevier, Amsterdam, 1984), pp. 407–410
- S. Root, J.R. Asay, Loading path and rate dependence of inelastic deformation: X-cut quartz. *J. Appl. Phys.* **106**, 056109 (2009a)
- S. Root, J.R. Asay, Loading path dependence of inelastic behavior: X-cut quartz, in *Shock Compression of Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, M.D. Furnish, W.W. Anderson, W.G. Proud, AIP Conference Proceedings, vol. 1195 (AIP, College Park, MD, 2009b), pp. 999–1002
- S. Root, R.J. Magyar, J.H. Carpenter, D.L. Hanson, T.R. Mattsson, Shock compression of a fifth period element: Liquid xenon to 840 GPa. *Phys. Rev. Lett.* **105**, 085501 (2010)
- S. Root, K.R. Cochrane, J.H. Carpenter, T.R. Mattsson, Carbon dioxide shock and reshock equation of state data to 8 Mbar: Experiments and simulations. *Phys. Rev. B* **87**, 224102 (2013a)
- S. Root, T.A. Haill, J.M.D. Lane, A.P. Thompson, G.S. Grest, D.G. Schroen, T.R. Mattsson, Shock compression of hydrocarbon foam to 400 GPa: Experiments, mesoscale modeling, and atomistic simulations. *J. Appl. Phys.* **114**, 103502 (2013b)
- S.E. Rosenthal, M.P. Desjarlais, K.R. Cochrane, Equation of state and electron transport effects in exploding wire evolution, in *Digest of Technical Papers PPPS-2001 IEEE Pulsed Power Plasma Science*, ed. by R. Reinovsky, M. Newton, vol. 1 (IEEE, Piscataway, NJ, 2001), pp. 781–784
- S.D. Rothman, J.-P. Davis, J. Maw, C.M. Robinson, K. Parker, J. Palmer, Measurement of the principal isentropes of lead and lead-antimony alloy to ~400 kbar by quasi-isentropic compression. *J. Phys. D: Appl. Phys.* **38**, 733–740 (2005)
- J.S. Rottler, S.L. Thompson, input instructions for the radiation–hydrodynamics code CHARTD, SAND87-0651 (Sandia National Laboratories, Albuquerque, NM, 1987)
- A. Ruoff, L.C. Chhabildas, The sodium chloride primary pressure gauge. *J. Appl. Phys.* **47**(11), 4867–4872 (1976)

- E.E. Salpeter, On convection and gravitational layering in Jupiter and in stars of low mass. *Ap. J. Lett.* **181**, L83–L86 (1973)
- T.W.L. Sanford, G.O. Allshouse, B.M. Marder, T.J. Nash, R.C. Mock et al., Improved symmetry greatly increases x-ray power from wire-array z-pinches. *Phys. Rev. Lett.* **77**, 5063–5066 (1996)
- G.S. Sarkisov, S.E. Rosenthal, K.R. Cochran et al., Nanosecond electrical explosion of thin aluminum wires in a vacuum: Experimental and computational investigations. *Phys. Rev. E* **71**, 046404 (2005)
- B. Schmitt, CTH strong scaling results for a one trillion zone problem to 156 million cores, SAND2013-8753 (Sandia National Laboratories, Albuquerque, NM, 2013)
- K.W. Schuler, Propagation of steady shock waves in polymethyl methacrylate. *J. Mech. Phys. Solids* **18**, 277–293 (1970)
- K.W. Schuler, The speed of propagation of release waves in polymethyl methacrylate, in *Proceedings of the 5th International Detonation Symposium*, ONRACR-184, ed. by S.J. Jacobs, R. Roberts (Office of Naval Research, Washington, D.C., 1971), pp. 470–477
- K.W. Schuler, J.W. Nunziato, The dynamic mechanical behavior of polymethyl methacrylate. *Rheol. Acta* **13**, 773–781 (1974)
- K.W. Schuler, J.W. Nunziato, The unloading and reloading behavior of shock compressed polymethyl methacrylate. *J. Appl. Phys.* **47**, 2995–2998 (1976)
- K.W. Schuler, P.C. Lysne, A.L. Stevens, Dynamic mechanical properties of two grades of oil shale. *Intl. J. Rock Mech. Min. Sci.* **13**, 91–95 (1976)
- K.W. Schuler, R.A. Schmidt, Mechanical properties of oil shale of importance to in-situ rubblization, in *Proceedings of the American Nuclear Society Topical Meeting Energy and Mineral Resource Recovery* (ANS, La Grange Park, IL, 1977), pp. 381–391
- D.M. Schuster, R.P. Reed, Fracture behavior of shock loaded boron aluminum composite materials. *J. Compos. Mater.* **3**, 562–576 (1969)
- R.L. Schwoebel, *Explosion aboard the Iowa* (Naval Institute Press, Annapolis, MD, 1999)
- A.B. Sefkow, S.A. Slutz, J.M. Koning, M.M. Marimak, K.J. Peterson, D.B. Sinars, R.A. Vesey, Design of magnetized liner inertial fusion experiments using the Z facility. *Phys. Plasmas* **21**, 72711 (2014)
- R.E. Setchell, Index of refraction of shock-compressed fused silica and sapphire. *J. Appl. Phys.* **50**, 8186–8192 (1979)
- R.E. Setchell, Ramp-wave initiation of granular explosives. *Combust. Flame* **43**, 255–264 (1981)
- R.E. Setchell, Short-pulse shock initiation of granular explosives, in *Proceedings of the 7th International Detonation Symposium*, NSWC MP 82-334, ed. by J.M. Short, S.J. Jacobs (Naval Surface Warfare Center, Dahlgren, VA, 1982), pp. 857–864
- R.E. Setchell, Effects of precursor waves in shock initiation of granular explosives. *Combust. Flame* **54**, 171–182 (1983)
- R.E. Setchell, Grain-size effects on the shock sensitivity of HNS explosives. *Combust. Flame* **56**, 343–345 (1984)
- R.E. Setchell, Experimental studies of chemical reactivity during shock initiation of hexanitrostilbene, in *Proceedings of the 8th International Detonation Symposium*, NSWC MP 86-194, ed. by J.M. Short, W.E. Deal (Naval Surface Warfare Center, Dahlgren, VA, 1986), pp. 15–25
- R.E. Setchell, Microstructural effects in shock initiation of granular explosives, in *Proceedings of the International Symposium on Pyrotechnics and Explosives*, ed. by D. Jing (China Academic Publishers, Beijing, 1987), p. 635
- R.E. Setchell, P.A. Taylor, A refined equation of state for unreacted hexanitrostilbene. *J. Energ. Mater.* **6**, 157–159 (1988)
- R.E. Setchell, S.T. Montgomery, L.C. Chhabildas, M.D. Furnish, The effects of shock stress and field strength on shock-induced depoling of normally poled PZT 95/5, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson, AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 979–982
- R.E. Setchell, Refractive index of sapphire at 532 nm under shock compression and release. *J. Appl. Phys.* **91**, 2833–2841 (2002)

- R.E. Setchell, Shock wave compression of the ferroelectric ceramic $\text{Pb}_{0.99}(\text{Zr}_{0.95}\text{Ti}_{0.05})_{0.98}\text{Nb}_{0.02}\text{O}_3$: Hugoniot states and constitutive mechanical properties. *J. Appl. Phys.* **94**, 573–588 (2003)
- R.E. Setchell, Shock wave compression of the ferroelectric ceramic $\text{Pb}_{0.99}(\text{Zr}_{0.95}\text{Ti}_{0.05})_{0.98}\text{Nb}_{0.02}\text{O}_3$: depoling currents. *J. Appl. Phys.* **97**, 013507 (2005)
- R.E. Setchell, S.T. Montgomery, D.E. Cox, M.U. Anderson, Dielectric properties of PZT 95/5 during shock compression under high electric fields, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, M. Elert, T.P. Russell, C.T. White, AIP Conference Proceedings, vol. 845 (AIP, College Park, MD, 2006), pp. 278–281
- R.E. Setchell, Shock wave compression of the ferroelectric ceramic $\text{Pb}_{0.99}(\text{Zr}_{0.95}\text{Ti}_{0.05})_{0.98}\text{Nb}_{0.02}\text{O}_3$: Microstructural effects. *J. Appl. Phys.* **101**, 053525 (2007)
- R.E. Setchell, M.U. Anderson, S.T. Montgomery, Compositional effects of the shock-compression response of alumina-filled epoxy. *J. Appl. Phys.* **101**, 083527 (2007a)
- R.E. Setchell, S.T. Montgomery, D.E. Cox, M.U. Anderson, Initial temperature effects on the dielectric properties of PZT 95/5 during shock compression, in *Shock Compression of Condensed Matter*, ed. by M. Elert, M.D. Furnish, R. Chau, N. Holmes, J. Nguyen, AIP Conference Proceedings, vol. 555 (AIP, College Park, MD, 2007b), pp. 193–196
- S.A. Sheffield, J.W. Rogers Jr., J.N. Castañeda, Velocity measurements of laser-driven flyers backed by high-impedance windows, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 541–545
- S.A. Silling, P.A. Taylor, J.L. Wise, M.D. Furnish, Micromechanical modeling of advanced materials, SAND94-0129 (Sandia National Laboratories, Albuquerque, NM, 1994)
- I.K. Simonsen, Y. Horie, R.A. Graham, Shock synthesis of nickel aluminides, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 743–748
- S.A. Slutz, M.C. Herrmann, R.A. Vesey, A.B. Sefkow, D.B. Sinars, D.C. Rovang, K.J. Peterson, M.E. Cuneo, Pulsed power-driven cylindrical liner implosions of laser preheated fuel magnetized with an axial field. *Phys. Plasmas* **17**, 56303 (2010)
- J.H. Smith, L.M. Barker, Measurement of tilt, impact velocity, and impact time between two plane surfaces, SC-4728 (RR) (Sandia National Laboratories, Albuquerque, NM, 1962)
- J.E. Smugersky, T.T. McCabe, R.A. Graham, Effect of powder particle size and shape on the microstructure of explosively compacted stainless steel, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 411–414
- B. Song, W. Chen, S.T. Montgomery, M.J. Forrestal, Mechanical response of an alumina-filled epoxy at various strain rates. *J. Compos. Mat.* **43**(14), 1519–1536 (2009)
- R.B. Spielman, F. Long, T.H. Martin, J.W. Poukey, D.B. Seidel, W.A. Stygar, D.H. McDaniel, M.A. Mostrom, K.W. Struve, P. Corcoran, I. Smith, P. Spence, PBFA II-Z: A 20-MA driver for z-pinch experiments, in *Digest of Technical Papers 10th IEEE International Pulsed Power Conference*, ed. by W.L. Baker, G. Cooperstein (IEEE, Piscataway, NJ, 1995), pp. 396–404
- R.B. Spielman, C. Deeney, G.A. Chandler, M.R. Douglas, D.L. Fehl, M.K. Matzen, D.H. McDaniel, T.J. Nash, J.L. Porter, T.W.L. Sanford, J.F. Seaman, W.A. Stygar, K.W. Struve, S.P. Breeze, J.S. McGurn, J.A. Torres, D.M. Zagar, T.L. Gilliland, D.O. Jobe, J.L. McKenney, R.C. Mock, M. Vargas, T. Wagoner, D.L. Peterson, PBFA Z: A 60-TW/5-MJ z-pinch driver, in *Dense Z-Pinches*, AIP Conference Proceedings, vol. 409 (AIP, College Park, MD, 1997), pp. 101–118
- G. Stansbery, Space waste (Chapter 26), in *Waste: A Handbook for Management*, ed. by T.M. Letcher, D.A. Vallero (Elsevier, New York, NY, 2011), pp. 377–391
- P.L. Stanton, R.A. Graham, The electrical and mechanical response of lithium niobate shock loaded above the Hugoniot elastic limit. *Appl. Phys. Lett.* **31**(11), 723–725 (1977)
- P.L. Stanton, E.A. Igel, L.M. Lee, J.H. Mohler, G.T. West, Characterization of the DDT explosive, CP, in *Proceedings of the 7th International Detonation Symposium*, NSWC MP 82-334, ed. by J.M. Short, S.J. Jacobs (Naval Surface Warfare Center, Dahlgren, VA, 1982), pp. 865–876
- D.J. Steinberg, S.G. Cochran, M.W. Guinan, A constitutive model for metals applicable at high-strain rate. *J. Appl. Phys.* **51**, 1498–1504 (1980)
- D.J. Steinberg, C.M. Lund, A constitutive model for strain rates from 10^{-4} to 10%/s. *J. Appl. Phys.* **65**, 1528–1533 (1989)

- D.J. Steinberg, Equation-of-state and strength properties of selected materials, UCRL-MA-106439 (Lawrence Livermore National Laboratory, Livermore, CA, 1996) [This is the revised version; an earlier version with the same report no. was published in 1991]
- A.L. Stevens, L.E. Pope, Observations of secondary slip in impact-loaded aluminum single crystals (1). *Scripta Metall.* **5**, 981–986 (1971)
- A.L. Stevens, F.R. Tuler, Effect of shock precompression on the dynamic fracture strength of 1020 steel and 6061-T6 aluminum. *J. Appl. Phys.* **42**(13), 5665–5670 (1971)
- A.L. Stevens, O.E. Jones, Radial stress release phenomena in plate impact experiments: compression-release. *J. Appl. Mech. Trans. ASME* **39**, 359–366 (1972)
- A.L. Stevens, L.W. Davison, W.E. Warren, Spall fracture in aluminum monocrystals: A dislocation-dynamics approach. *J. Appl. Phys.* **43**(12), 4922–4927 (1972)
- A.L. Stevens, L.E. Pope, Wave propagation and spallation in textured beryllium, in *Metallurgical Effects at High Strain Rates*, ed. by R.W. Rohde, B.M. Butcher, J.R. Holland, C.H. Karnes (Plenum, New York, NY, 1973), pp. 459–472
- A.L. Stevens, L.W. Davison, W.E. Warren, Void growth during spall fracture of aluminum monocrystals, in *Dynamic Crack Propagation*, ed. by G.C. Sih (Noordhoff, Leyden, 1973), pp. 37–48
- A.L. Stevens, Residual mechanical properties of textured and spalled-damage beryllium, presented at AIAA/ASME/SAE 15th Structures, Structural Dynamics and Materials Conference, AIAA Paper No. 74-399 (AIAA, Reston, VA, 1974)
- A.L. Stevens, P.C. Lysne, G.B. Griswold, Rock Springs oil shale fracturization experiment: Experimental results and concept evaluation, SAND74-0372 (Sandia National Laboratories, Albuquerque, NM, 1974)
- P.H. Stolz, B.V. Oliver, Growth rates of the $m=0$ mode for Bennett equilibria with varying radial density and temperature profiles. *Phys. Plasmas* **8**(6), 3096–3098 (2001)
- R.H. Stresau, J.E. Kennedy, Critical conditions for shock initiation of detonation in real systems, in *Proceedings of the 6th International Detonation Symposium*, ONR ACR-221, ed. by S.J. Jacobs, D.J. Edwards (Office of Naval Research, Washington, D.C., 1976), pp. 68–75
- R.M. Summers, J.S. Peery, M.K. Wong, E.S. Hertel Jr., T.G. Trucano, L.C. Chhabildas, Recent progress in ALEGRA development and application to ballistic impacts. *Int. J. Impact Eng.* **20**, 779–788 (1997)
- C.T. Sun, J.D. Achenbach, G. Herrmann, Continuum theory for a laminated medium. *J. Appl. Mech.* **35**, 467–475 (1968)
- H.J. Sutherland, J.E. Kennedy, Acoustic characterization of two unreacted explosives. *J. Appl. Phys.* **46**(6), 2439–2444 (1975)
- H.J. Sutherland, J.W. Nunziato, D.S. Drumheller, J.E. Kennedy, Wave propagation in unreacted, heterogeneous explosive materials, in *Proceedings of 12th Annual Meeting of the Society of Engineering Science*, ed. by M. Stern (Elsevier, Amsterdam, 1975), pp. 509–517
- H.J. Sutherland, J.E. Kennedy, J.W. Nunziato, Behavior of the longitudinal acoustic velocity in PBX-9404 during thermal decomposition, SAND 77-0577 (Sandia National Laboratories, Albuquerque, NM, 1977)
- J.C. Swearingen, R.W. Rohde, D.L. Hicks, Mechanical state relations for inelastic deformation of iron: The choice of variables. *Acta Metall.* **24**, 969–975 (1976)
- M.A. Sweeney, History of z-pinch research in the U.S., in *Fifth International Conference on Dense Z Pinches*, ed. by J. Davis, C. Deeney, N.R. Pereira, AIP Conference Proceedings, vol. 651 (AIP, College Park, MD, 2002), pp. 9–14
- J.W. Swegle, L.C. Chhabildas, Technique for the generation of pressure-shear loading using anisotropic crystals, in *Shock Waves and High Strain-Rate Phenomena in Metals*, ed. by M. Meyers, L. Murr (Springer, New York, NY, 1981), pp. 401–415
- J.W. Swegle, D.E. Grady, Shock viscosity and the prediction of shock wave rise times. *J. Appl. Phys.* **58**(2), 692–701 (1985)
- J.W. Swegle, D.E. Grady, Calculation of thermal trapping in shear bands, in *Metallurgical Applications of Shock-Wave and High-Strain-Rate Phenomena*, ed. by L.E. Murr, K.P. Staudhammer, M.A. Meyers (Marcel Dekker, New York, NY, 1986a), pp. 705–722

- J.W. Swegle, D.E. Grady, Shock viscosity and the calculations of steady shock wave profiles, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986b), pp. 353–357
- G.I. Taylor, The testing of materials at high rates of loading. *J. Inst. Civil Eng.* **26**, 486–519 (1946)
- G.I. Taylor, The use of flat ended projectiles for determining yield stress I. Theoretical considerations. *Proc. R. Soc. Lond.* **A194**, 289–299 (1948)
- L.M. Taylor, D.P. Flanagan, PRONTO-3D: A three-dimensional transient solid dynamics program, SAND87-1912 (Sandia National Laboratories, Albuquerque, NM, 1989)
- P.A. Taylor, M.B. Boslough, Y. Horie, Modeling of shock-induced chemistry in nickel-aluminum systems, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt et al. (Elsevier, Amsterdam, 1988), pp. 395–398
- S.L. Thompson, CHARTD—A computer program for calculating problems of coupled hydrodynamic motion and radiation flow in one dimension, SC-RR-69-613 (Sandia National Laboratories, Albuquerque, NM, 1969)
- S.L. Thompson, Improvements in the CHARTD radiation-hydrodynamic code I: Analytic equations of state, SC-RR-70-28 (Sandia National Laboratories, Albuquerque, NM, 1970)
- S.L. Thompson, H.S. Lauson, Improvements in the CHARTD radiation-hydrodynamic code IV: User aid programs, SC-DR-71-0715 (Sandia National Laboratories, Albuquerque, NM, 1972)
- S.L. Thompson, Improvements in the CHARTD energy flow hydrodynamic code V: 1972/73 modifications, SLA-73-0477 (Sandia National Laboratories, Albuquerque, NM, 1973)
- S.L. Thompson, CKEOS2—An equation of state test program for the CHARTD/CSQ EOS package, SAND76-0175 (Sandia National Laboratories, Albuquerque, NM, 1976)
- S.L. Thompson, CSQII—An Eulerian finite difference program for two-dimensional material response—Part I material sections, SAND77-1339 (Sandia National Laboratories, Albuquerque, NM, 1979)
- S.L. Thompson, ANEOS analytic equations of state for shock physics codes input manual, SAND89-2951 (Sandia National Laboratories, Albuquerque, NM, 1990)
- B.J. Thorne, W. Herrmann, TOODY: A computer program for calculating problems of motion in two dimension, SC-RR-66-602 (Sandia National Laboratories, Albuquerque, NM, 1967)
- T.F. Thornhill, L.C. Chhabildas, W.D. Reinhart, D.L. Davidson, Particle launch to 19 km/s for micro-meteoroid simulation using enhanced three-stage light gas gun hypervelocity launcher techniques. *Int. J. Impact Eng.* **33**, 799–811 (2006)
- T.F. Thornhill, W.D. Reinhart, L.C. Chhabildas, W.G. Breiland, C.S. Alexander, J.L. Brown, Characterization of prompt flash signatures using high speed broadband diode detectors. *Int. J. Impact Eng.* **35**, 1827–1835 (2008)
- T.F. Thornhill, L.C. Chhabildas, W.D. Reinhart, Time-resolved optical signatures for Hugoniot state measurements in shock compressed composition B, in *Shock Waves in Condensed Matter*, ed. by M.L. Elert, W.T. Buttler, M.D. Furnish, W.W. Anderson, W.G. Proud, AIP Conference Proceedings, vol. 1195 (AIP, College Park, MD, 2009), pp. 404–407
- S. Thunborg, G.E. Ingram, R.A. Graham, Compressed gas gun for controlled planar impacts over a wide velocity range. *Rev. Sci. Instrum.* **35**(1), 11–14 (1964)
- W.M. Trott, A.M. Renlund, Pulsed-laser-excited Raman spectra of shock-compressed triamino-trinitrobenzene, in *Proceedings of the 9th International Detonation Symposium*, ONR 113291-7, ed. by J.M. Short, E.L. Lee (Office of Naval Research, Washington, D.C., 1989), pp. 153–161
- W.M. Trott, K.D. Meeks, Acceleration of thin foil targets using fiber-coupled optic pulses, in *Shock Compression of Condensed Matter*, ed. by S.C. Schmidt, J.N. Johnson, L.W. Davison (Elsevier, New York, NY, 1990a), pp. 997–1000
- W.M. Trott, K.D. Meeks, High-power Nd glass laser transmission through optical fibers and its use in acceleration of thin foil targets. *J. Appl. Phys.* **67**, 3297–3301 (1990b)
- W.M. Trott, Investigation of the dynamic behavior of laser-driven flyers, in *High-Pressure Science and Technology*, ed. by S.C. Schmidt, J.W. Shaner, G.A. Samara, M. Ross, AIP Conference Proceedings, vol. 309 (AIP, College Park, MD, 1994), pp. 1655–1658
- W.M. Trott, M.D. Knudson, L.C. Chhabildas, J.R. Asay, Measurements of spatially resolved velocity variations in shock compressed heterogeneous materials using a line-imaging velocity interferom-

- eter, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, L.C. Chhabildas, R.S. Hixson, AIP Conference Proceedings, vol. 505 (AIP, College Park, MD, 2000), pp. 993–998
- W.M. Trott, J.N. Castañeda, J.J. O'Hare, M.D. Knudson, L.C. Chhabildas, M.R. Baer, J.R. Asay, Examination of the mesoscopic scale response of shock compressed heterogeneous materials using a line-imaging velocity interferometer, in *Fundamental Issues and Applications of Shock-Wave and High-Strain-Rate Phenomena*, ed. by K.P. Staudhammer, L.E. Murr, M.A. Meyers (Elsevier, New York, NY, 2001), pp. 647–654
- W.M. Trott, R.E. Setchell, A.V. Farnsworth Jr., Development of laser-driven flyer techniques for equation-of-state studies of microscale materials, in *Shock Compression of Condensed Matter, AIP Conference Proceedings*, ed. by M.D. Furnish, N.N. Thadhani, Y. Horie, vol. 505 (AIP, College Park, MD, 2002), pp. 1347–1350
- W.M. Trott, M.R. Baer, J.N. Castañeda, A.S. Tappan, J.N. Stuecker, J. Cesarano, Shock-induced reaction in a nitromethane-impregnated geometrically regular sample configuration, in *Proceedings of the 13th International Detonation Symposium*, ONR-351-07-01, ed. by S. Peiris, R.M. Doherty (Office of Naval Research, Washington, D.C., 2006), pp. 308–318
- W.M. Trott, M.R. Baer, J.N. Castañeda, L.C. Chhabildas, J.R. Asay, Investigation of the mesoscopic scale response of low-density pressings of granular sugar under impact. *J. Appl. Phys.* **101**(2), 024917 (2007)
- T.G. Trucano, L.M. Barker, J.R. Asay, G.I. Kerley, Numerical studies of the dynamic isentropic loading of solid molecular hydrogen, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 461–465
- T.G. Trucano, J.R. Asay, Effects of vaporization on debris cloud dynamics. *Int. J. Impact Eng.* **5**, 645–653 (1987)
- T.G. Trucano, J.R. Asay, L.C. Chhabildas, Hydrocode benchmarking of 1-D shock vaporization experiments, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 163–166
- T.G. Trucano, D.E. Grady, J.M. McGlaun, Fragmentation statistics from Eulerian hydrocode calculations. *Int. J. Impact Eng.* **10**, 587–600 (1990)
- T.G. Trucano, L.C. Chhabildas, Calculations supporting hypervelocity launcher development, in *High Pressure Science and Technology*, ed. by S.C. Schmidt, J.W. Shaner, G.A. Samara, M. Ross, AIP Conference Proceedings, vol. 309 (AIP, College Park, MD, 1993), pp. 1639–1642
- T.G. Trucano, J.M. McGlaun, A. Farnsworth, Computational methods for describing the laser-induced mechanical response of tissue, in *Proceedings of Laser-Tissue Interactions V* (SPIE Proceedings Series 2134A), ed. by S.L. Jacques (SPIE, Bellingham, WA, 1994), pp. 179–203
- T.G. Trucano, L.C. Chhabildas, Computational design of hypervelocity launchers. *Int. J. Impact Eng.* **17**, 849–860 (1995)
- T.G. Trucano, D. Grady, G. Kubiak, M. Kipp, R. Olson, A. Farnsworth, Swords to plowshares: Shock wave applications to advanced lithography. *Int. J. Impact Eng.* **17**, 873–890 (1995)
- T.G. Trucano, K.G. Budge, R.J. Lawrence et al., Analysis of z pinch shock wave experiments, SAND99-1255 (Sandia National Laboratories, Albuquerque, NM, 1999)
- R.F. Trunin, L.F. Gudarenko, M.V. Zhernokletov, G.V. Simakov, *Experimental Data on Shock Compression and Adiabatic Expansion of Condensed Matter* (Russian Federal Nuclear Center, Sarov, VNIIEF, 2001)
- T.J. Tucker, J.E. Kennedy, D.L. Allensworth, Secondary explosive spark detonators, in *Proceedings of the 7th Symposium on Explosives and Pyrotechnics*, (Franklin Institute, Philadelphia, PA, 1971) [Also appeared as SC-R-713486. Sandia National Laboratories, Albuquerque, NM]
- F.R. Tuler, B.M. Butcher, A criterion for the time dependence of dynamic fracture. *Int. J. Fract. Mech.* **4**(4), 431–437 (1968)
- S.J. Turneaure, Y.M. Gupta, X-ray diffraction and continuum measurements in silicon crystals shocked below the elastic limit. *Appl. Phys. Lett.* **90**, 051905 (2007)
- A.V. Utkin, G.I. Kanel, S.V. Razorenov, A.A. Bogach, D.E. Grady, Elastic moduli and dynamic yield strength of metals near the melting temperature, in *Shock Compression of Condensed Matter*, ed. by S. Schmidt, D. Dandekar, J. Forbes, AIP Conference Proceedings, vol. 429 (AIP, College Park, MD, 1998), pp. 443–446

- E.L. Venturini, B. Morosin, R.A. Graham, Magnetic properties of shock-synthesized and furnace-reacted zinc ferrite, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 815–820
- E.L. Venturini, R.A. Graham, B. Morosin, Static magnetization and microwave loss in shock-modified ferrites, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 451–456
- T.J. Vogler, T.F. Thornhill, W.D. Reinhart, L.C. Chhabildas, D.E. Grady, L.V. Wilson, O. Hurricane, A. Woo, Fragmentation of materials in expanding tube experiments. *Int. J. Impact Eng.* **29**, 735–746 (2003)
- T.J. Vogler, J.R. Asay, A distributional model for elastic-plastic behavior of shock-loaded materials, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, Y.M. Gupta, J.W. Forbes, AIP Conference Proceedings, vol. 706 (AIP, College Park, MD, 2004), pp. 617–620
- T.J. Vogler, W.D. Reinhart, L.C. Chhabildas, Dynamic behavior of boron carbide. *J. Appl. Phys.* **95**, 173–4183 (2004)
- T.J. Vogler, L.C. Chhabildas, Strength behavior of materials at high pressures. *Int. J. Impact Eng.* **33**, 812–825 (2006)
- T.J. Vogler, M.Y. Lee, D.E. Grady, Static and dynamic compaction of ceramic powders. *Int. J. Solids Struct.* **44**, 636–658 (2007)
- T.J. Vogler, J.D. Clayton, Heterogeneous deformation and spall of an extruded tungsten alloy: Plate impact experiments and crystal plasticity modeling. *J. Mech. Phys. Solids* **56**, 297–335 (2008)
- T.J. Vogler, W.M. Trott, W.D. Reinhart, C.S. Alexander, M.D. Furnish, M.D. Knudson, L.C. Chhabildas, Using the line-VISAR to study multi-dimensional and meso-scale impact phenomena. *Int. J. Impact Eng.* **35**, 1844–1852 (2008)
- T.J. Vogler, On measuring the strength of metals at ultra-high strain rates. *J. Appl. Phys.* **106**, 053530 (2009)
- T.J. Vogler, C.S. Alexander, J.L. Wise, S.T. Montgomery, Dynamic behavior of tungsten carbide and alumina filled epoxy composites. *J. Appl. Phys.* **107**, 043520 (2010)
- T.J. Vogler, C.S. Alexander, T.F. Thornhill, W.D. Reinhart, Pressure-shear experiments on granular materials, SAND2011-6700 (Sandia National Laboratories, Albuquerque, NM, 2011)
- T.J. Vogler, J.P. Borg, D.E. Grady, On the nature of steady structured waves in heterogeneous materials. *J. Appl. Phys.* **112**, 123507 (2012)
- E.K. Walsh, K.W. Schuler, Acceleration wave propagation in a nonlinear viscoelastic solid. *J. Appl. Mech.* **40**, 705–710 (1973)
- S.L. Wang, M.A. Meyers, R.A. Graham, Shock consolidation of IN-100 nickel-base superalloy powder, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 731–736
- M.C. Wanke, A.D. Grine, M.A. Mangan, L.C. Chhabildas, W.D. Reinhart, T.F. Thornhill, C.S. Alexander, J.L. Brown, W.G. Breiland, E.A. Shaner, P.A. Miller, Advanced diagnostics for impact-flash spectroscopy on light-gas guns, SAND2007-0835 (Sandia National Laboratories, Albuquerque, NM, 2007)
- W.R. Wawersik, W. Herrmann, S.T. Montgomery, H.S. Lauson, Excavation design in rock salt – laboratory experiments, material modeling and validations, in *Rock Mechanics: Caverns and Pressure Shafts*, ed. by W. Wittke (Balkema, Rotterdam, 1982), pp. 1345–1356
- S.T. Weir, A.C. Mitchell, W.J. Nellis, Metallization of fluid molecular hydrogen at 140 GPa (1.4 Mbar). *Phys. Rev. Lett.* **76**, 1860–1863 (1996)
- G.W. Wellman, K.W. Schuler, Structural consequences of railgun augmentation, *IEEE Trans Magnet.* **25**, 593–598 (1988)
- E. Wigner, H.B. Huntington, On the possibility of a metallic modification of hydrogen. *J. Chem. Phys.* **3**(12), 764–770 (1935)
- F.L. Williams, Y.K. Lee, B. Morosin, R.A. Graham, Catalytic activity of shock modified ZNO for CO oxidation and methanol synthesis, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986a), pp. 791–796

- F.L. Williams, B. Morosin, R.A. Graham, Influence of shock compression on the specific surface area of inorganic powders, in *Metallurgical Applications of Shock-Wave and High-Strain-Rate Phenomena*, ed. by L.E. Murr, K.P. Staudhammer, M.A. Meyers (Marcel Dekker, New York, NY, 1986b), pp. 1013–1022
- W.D. Williams, D.J. Fogelson, L.M. Lee, Carbon piezoresistive stress gauge, in *Shock Waves in Condensed Matter*, ed. by J.R. Asay, R.A. Graham, G.K. Straub (Elsevier, Amsterdam, 1984), pp. 121–124
- D.L. Williamson, B. Morosin, E.L. Venturini, R.A. Graham, Mossbauer study of shock-synthesized zinc ferrite, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 809–814
- L.T. Wilson, D.R. Reedal, M.E. Kipp, R.R. Martinez, D.E. Grady, Comparison of calculated and experimental results of fragmenting cylinder experiments, in *Fundamental Issues and Applications of Shock-Wave and High-Strain-Rate Phenomena* (Explomet 2000), ed. by K.P. Staudhammer et al. (Elsevier, Amsterdam, 2001), pp. 561–570
- J.M. Winey, J.N. Johnson, Y.M. Gupta, Unloading and reloading response of aluminum single crystals: Time-dependent anisotropic material description. *J. Appl. Phys.* **112**, 093509 (2012)
- J.L. Wise, L.C. Chhabildas, J.R. Asay, Shock compression of beryllium, in *Shock Waves in Condensed Matter*, ed. by W.J. Nellis, L. Seaman, R.A. Graham, AIP Conference Proceedings, vol. 78 (AIP, College Park, MD, 1982), pp. 417–421
- J.L. Wise, Refractive index and equation of state of a shock-compressed aqueous solution of zinc chloride, in *Shock Waves in Condensed Matter*, ed. by J.R. Asay, R.A. Graham, G.K. Straub (Elsevier, Amsterdam, 1984), pp. 317–320
- J.L. Wise, L.C. Chhabildas, Laser interferometer measurements of refractive index in shock-compressed materials, in *Shock Waves in Condensed Matter*, ed. by Y.M. Gupta (Plenum, New York, NY, 1986), pp. 441–454
- J.L. Wise, G.I. Kerley, T.G. Trucano, Shock-vaporization studies on zinc and porous carbon, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, R.D. Dick, J.W. Forbes, D.G. Tasker (Elsevier, Amsterdam, 1992), pp. 61–64
- J.L. Wise, D.E. Grady, Dynamic, multiaxial impact response of confined and unconfined ceramic rods, in *High-Pressure Science and Technology*, ed. by S.C. Schmidt, J.W. Shaner, G.A. Samara, M. Ross, AIP Conference Proceedings, vol. 309 (AIP, College Park, MD, 1994), pp. 777–780
- J.L. Wise, S.C. Jones, C.A. Hall, W.D. Reinhart, R.J. Hickman, J.W. Gluth, Effects of annealing and preheating on the impact response of selected braze materials, in *Shock Compression of Condensed Matter*, ed. by M.D. Furnish, M. Elert, T.P. Russell, C.T. White, AIP Conference Proceedings, vol. 845 (AIP, College Park, MD, 2006), pp. 686–689
- J.L. Wise, D.G. Dalton, R.J. Hickman, M.I. Kaufman, S.A. Leffler, M.J. Jones, J.J. Lynch, A.C. Bowers, Sample preheating capability for dynamic material studies, *Bulletin of the American Physical Society*, Vol. 58, No. 7, June 2013, p. 86
- E.P. Yu, B.V. Oliver, D.B. Sinars et al., Steady-state radiation ablation in the wire-array z pinch. *Phys. Plasmas* **14**, 022705 (2007)
- E.P. Yu, M.E. Cuneo, M.P. Desjarlais et al., Three-dimensional effects in the wire array z pinch. *Phys. Plasmas* **15**, 056301 (2008)
- F.J. Zeigler, WONDY VII: A vectorized version of the WONDY wave propagation code, SAND85-2338 (Sandia National Laboratories, Albuquerque, NM, 1986)
- F. Zeigler, J.M. McGlaun, S.L. Thompson, T.G. Trucano, Computations of hypervelocity impact using the CTH shock wave physics code, in *Shock Waves in Condensed Matter*, ed. by S.C. Schmidt, N.C. Holmes (Elsevier, Amsterdam, 1988), pp. 191–194
- D.H. Zeuch, S.T. Montgomery, J.D. Keck, Hydrostatic and triaxial compression experiments on unpoled PZT 95/5-2Nb ceramic: The effects of shear stress on the FR1→AO polymorphic phase transformation. *J. Mater. Res.* **7**(12), 3314–3332 (1992)
- D.H. Zeuch, S.T. Montgomery, J.D. Keck, Some observations on the effects of shear stress on a polymorphic transformation in perovskite-structured lead-zirconate-titanate ceramic. *J. Geophys. Res.* **98**(B2), 1901–1911 (1993)

- D.H. Zeuch, S.T. Montgomery, J.D. Keck, Further observations on the effects of nonhydrostatic compression on the FR1→AO polymorphic phase transformation in niobium-doped, lead-zirconate-titanate ceramic. *J. Mater. Res.* **9**(12), 1322–1327 (1994)
- D.H. Zeuch, S.T. Montgomery, D.J. Holcomb, The effects of nonhydrostatic compression and applied electric field on the electromechanical behavior of poled lead zirconate titanate PZT 95/5-2Nb ceramic during the ferroelectric to antiferroelectric polymorphic transformation. *J. Mater. Res.* **14**(5), 1814–1827 (1999)
- D.H. Zeuch, S.T. Montgomery, D.J. Holcomb, Uniaxial compression experiments on lead zirconate titanate 95/5-2Nb ceramic: Evidence for an orientation-dependent, maximum compressive stress criterion for onset of the ferroelectric to antiferroelectric polymorphic transformation. *J. Mater. Res.* **15**(3), 689–703 (2000)
- S. Zhuang, G. Ravichandran, D.E. Grady, An experimental investigation of shock wave propagation in periodically layered composites. *J. Mech. Phys. Solids* **51**, 245–265 (2003)

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