Appendix

Notation used

A.1. Tensors

scalar (0th rank)	a
vector (1st rank)	$\underline{\boldsymbol{a}}$
2nd-rank tensor	$\underset{\sim}{\boldsymbol{a}}$
3rd-rank tensor	$\underset{\approx}{\boldsymbol{a}}$ or $\underline{\underline{\boldsymbol{a}}}$
4th-rank tensor	$\underset{\sim}{\underset{\sim}{\boldsymbol{A}}}$
nth-rank tensor ($n > 4$)	$A^{(n)}$

Contracted product:* ., :, ::, *etc.

$x = \underline{\boldsymbol{a}} \,.\, \underline{\boldsymbol{b}}$	$x = a_i b_i$
$\underline{\boldsymbol{x}} = \underset{\sim}{\boldsymbol{a}} \,.\, \underline{\boldsymbol{b}}$	$x_i = a_{ij} b_j$
$\underset{\sim}{\boldsymbol{x}} = \underset{\sim}{\boldsymbol{a}} \,.\, \underline{\boldsymbol{b}}$	$x_{ij} = a_{ik} b_{kj}$
$x = \underset{\sim}{\boldsymbol{a}} : \underset{\sim}{\boldsymbol{b}}$	$x = a_{ij} b_{ij}$
$\underset{\sim}{\boldsymbol{x}} = \underset{\sim}{\underset{\sim}{\boldsymbol{A}}} : \underset{\sim}{\boldsymbol{b}}$	$x_{ij} = A_{ijkl} b_{kl}$
$x = \underset{\sim}{\underset{\sim}{\boldsymbol{A}}} :: \underset{\sim}{\underset{\sim}{\boldsymbol{B}}}$	$x = A_{ijkl} B_{ijkl}$

Dyadic product:* $\otimes$, $\underline{\otimes}$, *etc.

$\underset{\sim}{\boldsymbol{x}} = \underline{\boldsymbol{a}} \otimes \underline{\boldsymbol{b}}$	$x_{ij} = a_j b_j$
$\underset{\sim}{\underset{\sim}{\boldsymbol{X}}} = \underset{\sim}{\boldsymbol{a}} \otimes \underset{\sim}{\boldsymbol{b}}$	$X_{ijkl} = a_{ij} b_{kl}$
$\underset{\sim}{\underset{\sim}{\boldsymbol{X}}} = \underset{\sim}{\boldsymbol{a}} \underline{\otimes} \underset{\sim}{\boldsymbol{b}}$	$X_{ijkl} = a_{ik} b_{jl}$
$\underset{\sim}{\underset{\sim}{\boldsymbol{X}}} = \underset{\sim}{\boldsymbol{a}} \overline{\otimes} \underset{\sim}{\boldsymbol{b}}$	$X_{ijkl} = a_{il} b_{kj}$

J. Besson et al., *Non-Linear Mechanics of Materials*,
Solid Mechanics and Its Applications 167,
DOI 10.1007/978-90-481-3356-7,

Special tensors

1	unit tensor: $\underset{\sim}{\mathbf{1}}$, $\underset{\approx}{\mathbf{1}}$ or sometimes $\underset{\sim}{\boldsymbol{I}}$, $\underset{\approx}{\boldsymbol{I}}$
$\underset{\approx}{\boldsymbol{J}}$	tensor such that: $\underset{\approx}{\boldsymbol{J}} : \underset{\sim}{\boldsymbol{a}} = \text{deviator}(\underset{\sim}{\boldsymbol{a}})$
$\underset{\approx}{\boldsymbol{K}}$	tensor such that: $\underset{\approx}{\boldsymbol{K}} : \underset{\sim}{\boldsymbol{a}} = \frac{1}{3}\,\text{Tr}(\underset{\sim}{\boldsymbol{a}})\underset{\sim}{\mathbf{1}}$

A.2. Vectors, matrices

$\{v\}$	vector (any dimension n)
$[M]$	matrix (any dimension $n \times m$)

Contracted products

$x = \{v\}\,.\,\{w\}$	$x = v_i v_j$
$\{x\} = [M]\,.\,\{v\}$	$x_j = M_{ij} v_j$
$x = [M] : [N]$	$x = M_{ij} N_{ij}$

Dyadic product

$$[X] = \{v\} \otimes \{w\} \qquad X_{ij} = v_i w_j$$

A.3. Voigt notation

To denote second and fourth-rank tensors, as well as to represent them numerically, we use Voigt's notation that consists in noting second-rank tensors as vectors and fourth-rank tensors as matrices. To note explicitly the use of such a notation, we will use the following conventions:

$$\text{Second-rank tensor} \quad \{\underset{\sim}{\boldsymbol{a}}\}$$

$$\text{Fourth-rank tensor} \quad [\underset{\approx}{\boldsymbol{A}}]$$

Usual Voigt notation distinguish the stress and strain tensors (symmetric case):

$$\underset{\sim}{\boldsymbol{\varepsilon}} \rightarrow \begin{Bmatrix} \varepsilon_{11} \\ \varepsilon_{22} \\ \varepsilon_{33} \\ \gamma_{12} = 2\varepsilon_{12} \\ \gamma_{23} = 2\varepsilon_{23} \\ \gamma_{31} = 2\varepsilon_{31} \end{Bmatrix} \quad \text{and} \quad \underset{\sim}{\boldsymbol{\sigma}} \rightarrow \begin{Bmatrix} \sigma_{11} \\ \sigma_{22} \\ \sigma_{33} \\ \sigma_{12} \\ \sigma_{23} \\ \sigma_{31} \end{Bmatrix} \tag{A.1}$$

We can also use another notation that allows us to work on the algebra of symmetric second-rank tensors:

$$\underset{\sim}{\boldsymbol{a}} \rightarrow \begin{Bmatrix} a_{11} \\ a_{22} \\ a_{33} \\ \sqrt{2}a_{12} \\ \sqrt{2}a_{23} \\ \sqrt{2}a_{31} \end{Bmatrix} \tag{A.2}$$

This solution allows a uniform notation. Moreover, we check that:

$$\underset{\sim}{\boldsymbol{a}} : \underset{\sim}{\boldsymbol{b}} = \{\underset{\sim}{\boldsymbol{a}}\}.\{\underset{\sim}{\boldsymbol{b}}\} \tag{A.3}$$

Remarks

Using an object-oriented language that authorizes operator overloading allows us to manipulate tensors directly [BES98a]. The second notation fits best this methodology.

Fourth-rank tensors must be written differently according to the kind of notation used for second-rank tensors.

Bibliography

[ABO88] M. ABOUAF, J.L. CHENOT, G. RAISSON, and P. BAUDUIN. Finite element simulation of hot isostatic pressing of metal powders. *Int. J. Numer. Methods Eng.*, 25(1):191–212, 1988.

[ACH93] P. ACHON. Comportement et tenacité d'alliages d'aluminium. PhD thesis, École Nationale Supérieure des Mines de Paris, 1993.

[ALL90] O. ALLIX, P. LADEVÈZE, E. LE DANTEC, and E. VITTECOQ. Damage Mechanics for composite laminates under complex loading. In J. BOEHLER, editor, *Yielding, Damage and Failure of Anisotropic Solids*, pages 551–569. Mechanical Engineering Publications, London, 1990.

[ALL94] L. ALLAIS, M. BORNERT, T. BRETHEAU, and D. CALDEMAISON. Experimental characterization of the local strain field in a heterogeneous elastoplastic material. *Acta Mater.*, 42:3865–3880, 1994.

[ANA96] L. ANAND and M. KOTHARI. A computational procedure for rate-independent crystal plasticity. *J. Mech. Phys. Solids*, 44:525–558, 1996.

[AND86] S. ANDRIEUX, Y. BAMBERGER, and J.-J. MARIGO. Un modèle de matériau microfissuré pour les bétons et les roches. *J. Méc. Théor. Appl.*, 5(3):471–513, 1986.

[ARG75] A.S. ARGON. *Constitutive Equations in Plasticity*. MIT Press, Cambridge, 1975.

[ARM66] P.J. ARMSTRONG and C.O. FREDERICK. A mathematical representation of the multiaxial Bauschinger effect. Technical Report RD/B/N731, CEGB, 1966.

[ARN97] S. ARNDT, B. SVENDSEN, and D. KLINGBEIL. Modellierung der Eigenspannungen and der Rißspitze mit einem Schägigungsmodell. *Tech. Mech.*, 17(4):323–332, 1997.

[ASA77] R.J. ASARO and J.R. RICE. Strain localization in ductile single crystals. *J. Mech. Phys. Solids*, 25:309–338, 1977.

[ASA83a] R.J. ASARO. Crystal plasticity. *J. Appl. Mech.*, 50:921–934, 1983.

[ASA83b] R.J. ASARO. Micromechanics of crystals and polycrystals. *Adv. Appl. Mech.*, 23:1–115, 1983.

[ASA85] R.J. ASARO and A. NEEDLEMAN. Texture development and strain hardening in rate dependent polycrystals. *Acta Metall.*, 33:923–953, 1985.

[ASH80] M.F. ASHBY and D.R.H. JONES. *Engineering Materials, volume 1: An Introduction to Their Properties and Applications*. Pergamon, Elmsford, 1980.

[AUB99] M. AUBERTIN, O.M.L. YAHYA, and M. JULIEN. Modeling mixed hardening of alkali halides with a modified version of an internal state variables model. *Int. J. Plast.*, 15:1067–1088, 1999.

J. Besson et al., *Non-Linear Mechanics of Materials*,
Solid Mechanics and Its Applications 167,
DOI 10.1007/978-90-481-3356-7, © Springer Science+Business Media B.V. 2010

[AUR94] F. AURICCHIO and R.L. TAYLOR. A generalized elastoplastic plate theory and its algorithmic implementation. *Int. J. Numer. Methods Eng.*, 37:2583–2608, 1994.

[BAL65] A. BALTOV and A. SAWCZUK. A rule of anisotropic hardening. *Acta Mech.*, 1:81–92, 1965.

[BAR01a] F. BARBE, L. DECKER, D. JEULIN, and G. CAILLETAUD. Intergranular and intragranular behavior of polycrystalline aggregates, part 1: FE model. *Int. J. Plast.*, 17(4):513–536, 2001.

[BAR01b] F. BARBE, S. FOREST, and G. CAILLETAUD. Intergranular and intragranular behavior of polycrystalline aggregates, part II: results. *Int. J. Plast.*, 17(4):537–566, 2001.

[BAS89] S. BASTE, R. EL GUERJOUMA, and A. GÉRARD. Mesure de l'endommagement anisotrope d'un composite céramique-céramique par une méthode ultrasonore. *Rev. Phys. Appl.*, 24:721–731, 1989.

[BAT82] K.J. BATHE. *Finite Element Procedures in Engineering Analysis*. Prentice Hall, New York, 1982.

[BAT91] J.L. BATOZ and G. DHATT. *Modélisation des Structures par Éléments Finis, I–III*. Hermès, Paris, 1991.

[BAX94] C. BAXEVANAKIS. Comportement statistique à rupture des composites stratifiés. PhD thesis, École Nationale Supérieure des Mines de Paris, 1993.

[BAZ88] Z.P. BAZANT and G. PIJAUDIER-CABOT. Nonlocal continuum damage, localization, instability and convergence. *J. Appl. Mech.*, 55:287–294, 1988.

[BEC86] R. BECKER and A. NEEDLEMAN. Effect of yield surface curvature on necking and failure in porous plastic solids. *J. Appl. Mech.*, 53:491–499, 1986.

[BEC88] R. BECKER, A. NEEDLEMAN, O. RICHMOND, and V. TVERGAARD. Void growth and failure in notched bars. *J. Mech. Phys. Solids*, 36:317–351, 1988.

[BEN87] A. BENALLAL and D. MARQUIS. Constitutive equations for nonproportional cyclic elasto-visco-plasticity. *J. Eng. Mater. Technol.*, 109:326, 1987.

[BEN89a] A. BENALLAL. Thermoviscoplasticité et endommagement des structures. Doctorat d'Etat, Université Pierre et Marie Curie, Paris 6, 1989.

[BEN89b] A. BENALLAL, R. BILLARDON, and G. GEYMONAT. Conditions de bifurcation à l'intérieur et aux frontières pour une classe de matériaux non-standards. *C. R. Acad. Sci. Paris, Série II*, 308:893–898, 1989.

[BEN91] A. BENALLAL. Quelques remarques sur le rôle du couplage thermomécanique dans les phénomènes de localisation. *C. R. Acad. Sci. Paris, Sér. II*, 312:117–122, 1991.

[BER79] M. BERVEILLER and A. ZAOUI. An extension of the self-consistent scheme to plastically flowing polycrystal. *J. Mech. Phys. Solids*, 26:325–344, 1979.

[BER81a] F.M. BEREMIN. Cavity formation from inclusions in ductile fracture. *Metall. Trans.*, 12A:723–731, 1981.

[BER81b] F.M. BEREMIN. Study of fracture criteria for ductile rupture of a 508 steel. In D. FRANÇOIS et al., editors, *International Conference of Fracture, Advances in Fracture Researches*, Cannes. Pergamon, Elmsford, 1981.

[BER97] M. BERVEILLER and F.D. FISCHER, editors. *Mechanics of Solids with Phase Change*. CISM Courses and Lectures, volume 368. Springer, Berlin, 1997.

[BER01] A. BERTRAM and B. SVENDSEN. On material objectivity and reduced constitutive equations. *Arch. Mech.*, 53:653–675, 2001.

[BER05] A. BERTRAM. *Elasticity and Plasticity of Large Deformations*. Springer, Berlin, 2005.

[BES88] J.-M. BESSON, M. JAEGER, and O. DÉBORDES. Homogénéisation de composites à base de tissus de fibres. In D. GAY and C. BORD, editors, *Composite Structures*, pages 77–90, 1988.

[BES92] J. BESSON and M. ABOUAF. Rheology of porous alumina and simulation of hot isostatic pressing. *J. Am. Ceram. Soc.*, 75:2165–2172, 1992.

[BES97] J. BESSON and R. FOERCH. Large scale object-oriented finite element code design. *Comput. Methods Appl. Mech. Eng.*, 142:165–187, 1997.

[BES98a] J. BESSON and R. FOERCH. Object-oriented programming applied to the finite element method, part I: general concepts. *Rev. Eur. Élém. Finis*, 7(5):535–566, 1998.

[BES98b] J. BESSON, R. LE RICHE, R. FOERCH, and G. CAILLETAUD. Object-oriented programming applied to the finite element method, part II: application to material behaviors. *Rev. Eur. Élém. Finis*, 7(5):567–588, 1998.

[BES04] J. BESSON. *Local Approach to Fracture*. Les Presses de l'Ecole des Mines de Paris, Paris, 2004.

[BIG91] D. BIGONI and T. HUECKEL. Uniqueness and localization, I: associative and nonassociative elastoplasticity. *Int. J. Solids Struct.*, 312:117–122, 1991.

[BIS51] J.F.W. BISHOP and R. HILL. A theoretical derivation of the plastic properties of a polycrystalline face-centered metal. *Philos. Mag.*, 42:414–427, 1951.

[BLA87] D. BLANC and J.L. STRUDEL. The Portevin-Le Chatelier instability: on a heterogeneous flow with a microscopic origin. In *Proceedings of the International Symposium on Metallurgy and Materials Sciences: Constitutive Relations and Their Physical Basis*, pages 227–238, Risø, Holland, 1987.

[BOE78] J.P. BOEHLER. Lois de comportement anisotropes des milieux continus. *J. Méc.*, 17(2):153–190, 1978.

[BOR91] R. DE BORST. Simulation of strain localization: a reappraisal of the Cosserat continuum. *Eng. Comput.*, 8:317–332, 1991.

[BOR01] M. BORNERT, T. BRETHEAU, and P. GILORMINI. *Homogénéisation en Mécanique des Matériaux*. Hermès, Paris, 2001.

[BOU96] A. BOURSIN, J.-L. CHABOCHE, and F. ROUDOLFF. Mécanique de l'endommagement avec conditions unilatérales et stockage d'énergie élastique. *C. R. Acad. Sci. Paris, Sér. II*, 323:369–376, 1996.

[BOU01] F. BOUYGE, I. JASIUK, and M. OSTOJA-STARZEWSKI. A micromechanically based couple-stress model of an elastic two-phase composite. *Int. J. Solids Struct.*, 38:1721–1735, 2001.

[BUI69] H.D. BUI. Etude de l'évolution de la frontière du domaine élastique avec l'écrouissage et relation de comportement élastoplastique des métaux cubiques. PhD thesis, Université Pierre et Marie Curie, Paris 6, 1969.

[BUR87] H. BURLET and G. CAILLETAUD. Modeling of cyclic plasticity in finite element codes. In C.S. DESAI, E. KREMPL, P.D. KIOUSIS, ET AL., editors, *International Conference on Constitutive Laws for Engineering Materials: Theory and Applications*, pages 1157–1164, Tucson, AZ, 1987.

[BUS77] D. BUSHNEL. A strategy for the solution of problems involving large deflections, plasticity and creep. *Int. J. Numer. Methods Eng.*, 11:683–708, 1977.

[BUS96] E.P. BUSSO and F.A. MCCLINTOCK. A dislocation mechanics-based crystallographic model of a B2-type intermetallic alloy. *Int. J. Plast.*, 12:1–28, 1996.

[CAI79] G. CAILLETAUD and J.-L. CHABOCHE. Macroscopic description of the microstructural changes induced by varying temperature: example of IN100 cyclic behaviour. In K.J. MILLER and R.F. SMITH, editors, *3rd International Conference on Mechanical Behaviour of Metals*, pages 23–32, Cambridge, UK, 1979.

[CAI80] G. CAILLETAUD, H. POLICELLA, and G. BAUDIN. Mesure de déformation et d'endommagement par mesure électrique. *Rech. Aérospatiale*, 1:69–75, 1980.

[CAI84] G. CAILLETAUD, H. KACZMAREK, and H. POLICELLA. Some elements on multiaxial behaviour of 316L stainless steel at room temperature. *Mech. Mater.*, 3:333–347, 1984.

[CAI87] G. CAILLETAUD. Une approche micromécanique phénoménologique du comportement inélastique des métaux. PhD thesis, Université Pierre et Marie Curie, Paris 6, 1987.

[CAI92] G. CAILLETAUD. A micromechanical approach to inelastic behaviour of metals. *Int. J. Plast.*, 8:55–73, 1992.

[CAI94] G. CAILLETAUD and P. PILVIN. Utilisation de modèles polycristallins pour le calcul par éléments finis. *Rev. Eur. Élém. Finis*, 3(4):515–541, 1994.

[CAI95] G. CAILLETAUD and K. SAÏ. Study of plastic/viscoplastic models with various inelastic mechanisms. *Int. J. Plast.*, 11:991–1005, 1995.

[CAI00] G. CAILLETAUD, C. DEPOID, D. MASSINON, and E. NICOULEAU-BOURLES. Elastoviscoplasticity with aging in aluminium alloys. In G.A. MAUGIN, R. DROUOT and F. SIDOROFF, editors, *Continuum Thermomechanics: The Art and Science of Modelling Material Behaviour (Paul Germain's Anniversary Volume)*, pages 75–86. Solid Mechanics and Its Applications. Kluwer Academic, Dordrecht, 2000.

[CAI03] G. CAILLETAUD, S. FOREST, D. JEULIN, F. FEYEL, I. GALLIET, V. MOUNOURY, and S. QUILICI. Some elements of microstructural mechanics. *Comput. Mater. Sci.*, 27:351–374, 2003.

[CAL97] S. CALLOCH and D. MARQUIS. Additional hardening due to tension–torsion nonproportional loadings: influence of the loading path shape. In S. KALLURI and P.J. BONNACUSE, editors, *Multiaxial Fatigue and Deformation Testing Techniques*, pages 113–130, 1997.

[CHA74] J.-L. CHABOCHE. Une loi différentielle d'endommagement de fatigue avec cumulation non linéaire. *Revue Fr. Méc.*, 50–51:71–82, 1974.

[CHA77] J.-L. CHABOCHE. Sur l'utilisation des variables d'état interne pour la description de la viscoplasticité cyclique avec endommagement. In *Problèmes Non Linéaires de Mécanique, Symposium Franco-Polonais de Rhéologie et Mécanique*, pages 137–159, 1977.

[CHA78] J.-L. CHABOCHE. Description phénoménologique de la viscoplasticité cyclique avec endommagement. Doctorat d'Etat, Université Pierre et Marie Curie, Paris 6, Paris, Juin 1978.

[CHA79a] J.-L. CHABOCHE. Le concept de contrainte effective appliqué à l'élasticité et à la viscoplasticité en présence d'un endommagement anisotrope. In J.-P. BOEHLER, editor, *Colloque EUROMECH 115*, pages 737–760. Editions du CNRS, Grenoble, 1979.

[CHA79b] J.-L. CHABOCHE, K. DANG VAN, and G. CORDIER. Modelisation of the strain memory effect on the cyclic hardening of 316 stainless steel. In *Proceedings SMIRT*, volume 5, page L11/3. Berlin, 1979.

[CHA81] J.-L. CHABOCHE. Continuous damage mechanics: a tool to describe phenomena before crack initiation. *Nucl. Eng. Des.*, 64:233–247, 1981.

[CHA86] A. CHAREWICZ and I.M. DANIEL. Fatigue damage mechanisms and residual properties of graphite/epoxy laminates. *Eng. Fract. Mech.*, 25:793–808, 1986.

[CHA88] J.-L. CHABOCHE. Continuum damage mechanics, parts I and II. *J. Appl. Mech.*, 55:59–72, 1988.

[CHA89] J.-L. CHABOCHE. Constitutive equations for cyclic plasticity and cyclic viscoplasticity. *Int. J. Plast.*, 5:247–302, 1989.

[CHA91] J.-L. CHABOCHE. On some modifications of kinematic hardening to improve the description of ratcheting effect. *Int. J. Plast.*, 7:661–678, 1991.

[CHA92a] J.-L. CHABOCHE. Damage induced anisotropy: on the difficulties associated with the active/passive unilateral condition. *Int. J. Damage Mech.*, 1(2):148–171, 1992.

[CHA92b] J.-L. CHABOCHE. A new unilateral condition for the description of material behaviour with anisotropic damage. *C. R. Acad. Sci. Paris, Sér. II*, 314:1395–1401, 1992.

[CHA93a] J.-L. CHABOCHE. Cyclic viscoplastic constitutive equations, part I: a thermodynamically consistent formulation. *J. Appl. Mech.*, 60:813–821, 1993.

[CHA93b] J.-L. CHABOCHE. Development of continuum damage mechanics for elastic solids sustaining anisotropic and unilateral damage. *Int. J. Damage Mech.*, 2:311–329, 1993.

[CHA93c] J.-L. CHABOCHE. Cyclic viscoplastic constitutive equations, parts I & II. *J. Appl. Mech.*, 60:813–831, 1993.

[CHA94] J.-L. CHABOCHE. Modeling of ratchetting: evaluation of various approaches. *Eur. J. Mech. A, Solids*, 13:501–518, 1994.

[CHA95] J.-L. CHABOCHE, N. EL-MAYAS, and P. PAULMIER. Modélisation thermodynamique des phénomènes de viscoplasticité, restauration et vieillissement. *C. R. Acad. Sci. Paris, Sér. II*, 320:9–16, 1995.

[CHA96a] J.-L. CHABOCHE. *Unified Cyclic Viscoplastic Constitutive Equations: Development, Capabilities and Thermodynamic Framework*, pages 1–68. Academic Press, New York, 1996.

[CHA96b] J.-L. CHABOCHE and G. CAILLETAUD. Integration methods for complex plastic constitutive equations. *Comput. Methods Appl. Mech. Eng.*, 133:125–155, 1996.

[CHA97] J.-L. CHABOCHE, R. GIRARD, and P. LEVASSEUR. On the interface debonding models. *Int. J. Damage Mech.*, 6:220–257, 1997.

[CHA02] J.-L. CHABOCHE and J.F. MAIRE. A new micromechanics based CDM model and its application to CMC's. *Aerospace Sci. Technol.*, 6(2):131–145, 2002.

[CHI69] G.Y. CHIN and W.L. MAMMEL. Generalization and equivalence of the minimum work (Taylor) and maximum work (Bishop–Hill) principles for crystal plasticity. *Trans. Metall. Soc. AIME*, 245:1211–1214, 1969.

[CHO87] C.L. CHOW and J. WANG. An anisotropic theory of continuum damage mechanics for ductile fracture. *Eng. Fract. Mech.*, 27(5):547–558, 1987.

[CHO89] C.L. CHOW and T.J. LU. On evolution laws of anisotropic damage. *Eng. Fract. Mech.*, 34:679–701, 1989.

[CHR76] M. CHRZANOWSKI. Use of the damage concept in describing creep-fatigue interaction under prescribed stress. *J. Mech. Sci.*, 18:69–73, 1976.

[CHR92] A. CHRYSOCHOOS and F. BELMAHJOUB. Thermographic analysis of thermomechanical couplings. *Arch. Mech.*, 44:55–68, 1992.

[CHR98] A. CHRYSOCHOOS and H. LOUCHE. Analyse thermographique des mécanismes de localisation dans des aciers doux. *C. R. Acad. Sci. Paris, Sér. II*, 326:345–352, 1998.

[COL67] B.D. COLEMAN and M.E. GURTIN. Thermodynamics with internal variables. *J. Chem. Phys.*, 47:597–613, 1967.

[CON89] E. CONTESTI and G. CAILLETAUD. Description of creep-plasticity interaction with non-unified constitutive equations. *Nucl. Eng. Des.*, 116:265–280, 1989.

[COR79] J.-P. CORDEBOIS and F. SIDOROFF. Anisotropie élastique induite par endommagement. In J.-P. BOEHLER, editor, *Colloque EUROMECH 115*. Editions du CNRS, Grenoble, 1979.

[COR82] J.-P. CORDEBOIS and F. SIDOROFF. Endommagement anisotrope en élasticité et plasticité. *J. Méc. Théor. Appl.*, Numéro spécial:45–60, 1982.

[COU91] O. COUSSY. *Mécanique des Milieux Poreux*. Technip, Paris, 1991.

[CUI92] A.M. CUITINO and M. ORTIZ. Computational modelling of single crystals. *Model. Simul. Mater. Sci. Eng.*, 1:225–263, 1992.

[DAR87] F. DARVE. *Manuel de Rhéologie des Géomatériaux*. Presses des Ponts et Chaussées, Paris, 1987.

[DEC98] K. DECAMP, L. BAUVINEAU, J. BESSON, and A. PINEAU. Size and geometry effects on ductile rupture of notched bars in a C–Mn steel: experiments and modelling. *Int. J. Fract.*, 88(1):1–18, 1998.

[DEL87] P. DELOBELLE and C. OYTANA. Modeling of 316 stainless steel mechanical properties using biaxial experiments, part I: experiments and basis of the model; part II: model and simulation. *J. Press. Vessel Technol.*, 109:149, 1987.

[DEL95] P. DELOBELLE, P. ROBINET, and L. BOCHER. Experimental study and phenomenological modelization of ratchet under uniaxial and biaxial loading on an austenitic stainless steel. *Int. J. Plast.*, 11:295–330, 1995.

[DEL96] P. DELOBELLE, P. ROBINET, P. GEYER, and P. BOUFFIOUX. A model to describe the anisotropic viscoplastic behavior of zircaloy-4 tubes. *J. Nucl. Mater.*, 238:135–162, 1996.

[DES89] C.S. DESAI and Q.S.E. HASHMI. Analysis, evaluation and implementation of a nonassociative model for geologic materials. *Int. J. Plast.*, 5(4):397–420, 1989.

[DEV97a] L. DEVILLERS-GUERVILLE. Rupture d'aciers inoxydables austéno-ferritiques moulés, fragilisés par vieillissement à 350–400°. PhD thesis, École Nationale Supérieure des Mines de Paris, 1997.

[DEV97b] L. DEVILLERS-GUERVILLE, J. BESSON, and A. PINEAU. Notch fracture toughness of a cast duplex stainless steel: modelling of experimental scatter and size effect. *Nucl. Eng. Des.*, 168:211–225, 1997.

[DIL06] T. DILLARD, S. FOREST, and P. IENNY. Micromorphic continuum modelling of the deformation and fracture behaviour of nickel foams. *Eur. J. Mech. A, Solids*, 25:526–549, 2006.

[DOE95] E. DOEGE, T. EL-DSOKI, and D. SEIBERT. Prediction of necking and wrinkling in sheet-metal forming. *J. Mater. Process. Technol.*, 50:197–206, 1995.

[DOG86] A. DOGUI and F. SIDOROFF. Rhéologie anisotrope en grandes déformations. In *Rhéologie des Matériaux Anisotropes*, pages 27–38. Cepadues, Toulouse, 1986.

[DOG95] I. DOGHRI and R. BILLARDON. Investigation of localization due to damage in elasto-plastic materials. *Mech. Mater.*, 19:129–149, 1995.

[DOG00] I. DOGHRI. *Mechanics of Deformable Solids. Linear and Nonlinear, Analytical and Computational Aspects*. Springer, Berlin, 2000.

[DOL00] I. DOLTSIRIS, editor. *Elements of Plasticity, Theory and Computation*. WIT Press, Southampton, 2000.

[DOQ90] V. DOQUET and A. PINEAU. Extra-hardening due to non-proportional loading of an austenitic stainless steel. *Scr. Metall. Mater.*, 24:433, 1990.

[DOU03] P. DOUMALIN, M. BORNERT, and J. CRÉPIN. Caractérisation de la répartition de la déformation dans les matériaux hétérogènes. *Méc. Ind.*, 4:607–617, 2003.

[DRA76] A. DRAGON. On phenomenological description of rock-like materials with account for kinetics of brittle fracture. *Arch. Mech. Stosow.*, 28(1):13–30, 1976.

[DUS93] M.K. DUSZEK-PERZYNA and P. PERZYNA. Adiabatic shear band localization in elastic-plastic single crystals. *Int. J. Solids Struct.*, 30(1):61–89, 1993.

[DUV72] G. DUVAUT and J.-L. LIONS. *Les Inéquations en Mécanique et en Physique*. Dunod, Paris, 1972.

[EBE98] F. EBERL, F. FEYEL, S. QUILICI, and G. CAILLETAUD. Approches numériques de la plasticité cristalline. *J. Phys. IV*, 8:Pr4-15–Pr4-25, 1998.

[ENG03] R.A.B. ENGELEN, M.G.D. GEERS, and F.P.T. BAAIJENS. Nonlocal implicit gradient-enhanced elasto-plasticity for the modelling of softening behaviour. *International Journal of Plasticity*, 19:403–433, 2003.

[ERI99] A.C. ERINGEN. *Microcontinuum Field Theories*. Springer, New York, 1999.

[ERI02] A.C. ERINGEN. *Nonlocal Continuum Field Theories*. Springer, New York, 2002.

[EST98] Y. ESTRIN, L.S. TÓTH, A. MOLINARI, and Y. BRÉCHET. A dislocation-based model for all hardening stages in large strain deformation. *Acta Mater.*, 46(15):5509–5522, 1998.

[FAV95] N. FAVROT. Etudes des différentes étapes de l'élaboration de structures graduelles en Wc-Co : compactage à froid, frittage, homogénéisation. PhD thesis, École Nationale Supérieure des Mines de Paris, 1995.

[FAV99] N. FAVROT, J. BESSON, C. COLIN, and F. DELANNAY. Cold compaction and solid state sintering of wc–co based structures: experiments and modeling. *J. Am. Ceram. Soc.*, 82(5):1153–1161, 1999.

[FOE97] R. FOERCH, J. BESSON, G. CAILLETAUD, and P. PILVIN. Polymorphic constitutive equations in finite element codes. *Comput. Methods Appl. Mech. Eng.*, 141:355–372, 1997.

[FOR95a] S. FOREST and G. CAILLETAUD. Strain localization in single crystals: effect of boundaries and interfaces. *Eur. J. Mech. A, Solids*, 14(5):747–771, 1995.

[FOR95b] S. FOREST and P. PILVIN. Modelling the cyclic behaviour of two-phase single crystal nickel-base superalloys. In A. PINEAU and A. ZAOUI, editors, *Micromechanics of Plasticity and Damage of Multiphase Materials*. Proceedings of the IUTAM Symposium, Sèvres, Paris, France, 29 August–1 September 1995, pages 51–58. Kluwer Academic, Dordrecht, 1995.

[FOR97] S. FOREST. Homogenization methods and the mechanics of generalized continua. In G.A. MAUGIN, editor, *International Seminar on Geometry, Continuum and Microstructure*, Paris, France, 28–29 May 1997. Collection Travaux en Cours, volume 60, pages 35–48. Hermann, Paris, 1997.

[FOR98a] S. FOREST. Mechanics of generalized continua: construction by homogenization. *J. Phys. IV*, 26:Pr4-39–Pr4-48, 1998.

[FOR98b] S. FOREST and K. SAB. Cosserat overall modeling of heterogeneous materials. *Mech. Res. Commun.*, 25:449–454, 1998.

[FOR99] S. FOREST and P. PILVIN. Modelling finite deformation of polycrystals using local objective frames. *Z. Angew. Math. Mech.*, 79:199–202, 1999.

[FOR00] S. FOREST, F. BARBE, and G. CAILLETAUD. Cosserat modelling of size effects in the mechanical behaviour of polycrystals and multiphase materials. *Int. J. Solids Struct.*, 37:7105–7126, 2000.

[FOR01] S. FOREST, P. BOUBIDI, and R. SIEVERT. Strain localization patterns at a crack tip in generalized single crystal plasticity. *Scr. Mater.*, 44:953–958, 2001.

[FOR03a] S. FOREST and R. SEDLÁČEK. Plastic slip distribution in two-phase laminate microstructures: dislocation-based vs. generalized-continuum approaches. *Philos. Mag. A*, 83:245–276, 2003.

[FOR03b] S. FOREST and R. SIEVERT. Elastoviscoplastic constitutive frameworks for generalized continua. *Acta Mech.*, 160:71–111, 2003.

[FOR05] S. FOREST. Generalized continua. In K.H.J. BUSCHOW, R.W. CAHN, M.C. FLEMINGS, B. ILSCHNER, E.J. KRAMER and S. MAHAJAN, editors, *Encyclopedia of Materials: Science and Technology updates*, pages 1–7. Elsevier, Oxford, 2005.

[FOR06a] S. FOREST. *Milieux Continus Généralisés et Matériaux Hétérogènes*. Les Presses de l'Ecole des Mines de Paris, Paris, 2006.

[FOR06b] S. FOREST and R. SIEVERT. Nonlinear microstrain theories. *Int. J. Solids Struct.*, 43:7224–7245, 2006.

[FRA80] P. FRANCIOSI, M. BERVEILLER, and A. ZAOUI. Latent hardening in copper and aluminium single crystals. *Acta Metall.*, 28:273, 1980.

[FRA83] G. FRANCFORT. Homogenization and linear thermoelasticity. *SIAM J. Math. Anal.*, 14:696–708, 1983.

[FRA85] P. FRANCIOSI. On flow and work hardening expression correlations in metallic single crystal plasticity. *Rev. Phys. Appl.*, 33:1601–1612, 1985.

[FRA91] D. FRANÇOIS, A. PINEAU, and A. ZAOUI. *Comportement Mécanique des Matériaux. Volume 1 : Élasticité et Élastoplasticité*. Hermès, Paris, 1991.

[FRA93] D. FRANÇOIS, A. PINEAU, and A. ZAOUI. *Comportement Mécanique des Matériaux. Volume 2 : Endommagement, Mécanique de la Rupture, Mécanique du Contact*. Hermès, Paris, 1993.

[FRA98] D. FRANÇOIS, A. PINEAU, and A. ZAOUI. *Mechanical Behaviour of Materials, volumes I and II*. Kluwer, Dordrecht, 1998.

[FRI64] J. FRIEDEL. *Dislocations*. Pergamon, Elmsford, 1964.

[GAI81] B.K.D. GAIROLA and E. KRÖNER. A simple formula for calculating the bounds and the self-consistent value of the shear modulus of polycrystalline aggregates of cubic crystals. *Int. Eng.Sci.*, 19:865–869, 1981.

[GEE01] M.G.D. GEERS, V. KOUZNETSOVA, and W.A.M. BREKELMANS. Gradient-enhanced computational homogenization for the micro-macro scale transition. *J. Phys. IV*, 11:Pr5-145–Pr5-152, 2001.

[GER73a] P. GERMAIN. La méthode des puissances virtuelles en mécanique des milieux continus, première partie : théorie du second gradient. *J. Méc.*, 12:235–274, 1973.

[GER73b] P. GERMAIN. *Mécanique des Milieux Continus*. Masson, Paris, 1973.

[GER83] P. GERMAIN, Q.S. NGUYEN, and P. SUQUET. Continuum thermodynamics. *J. Appl. Mech.*, 50:1010–1020, 1983.

[GOL83] G.H. GOLUB and C.F. VAN LOAN. *Matrix Computations*. The John Hopkins University Press, Baltimore, 1983.

[GOL94] M. GOLOGANU, J.B. LEBLOND, and J. DEVAUX. Approximate models for ductile metals containing non-spherical voids—case of axisymmetric oblate ellipsoidal cavities. *Trans. ASME, J. Eng. Mater. Technol.*, 116:290–297, 1994.

[GOL97] M. GOLOGANU, J.B. LEBLOND, and J. DEVAUX. Recent extensions of Gurson's model for porous ductile metals. In P. SUQUET, editor, *Continuum Micromechanics*. CISM Courses and Lectures, volume 377. Springer, Berlin, 1997.

[GOO84] A.M. GOODMAN. Development of constitutive equations for computer analysis of stainless steel components. *Nucl. Eng. Des.*, 83:349, 1984.

[GRE72] R.J. GREEN. A plasticity theory for porous solids. *Int. J. Mech. Sci.*, 14:215–224, 1972.

[GUI92] C. GUIONNET. Modeling of ratchetting in biaxial experiments. *J. Eng. Mater. Technol.*, 114:56–62, 1992.

[GUI98] C. GUILLEMER-NEEL, X. FEAUGAS, V. BOBET, and M. CLAVEL. Damage kinetics in ferritic spheroidal graphite cast iron. In *ECF 12, Fracture from Defect*, volume II, pages 721–726, 1998.

[GUR77] A.L. GURSON. Continuum theory of ductile rupture by void nucleation and growth, part I: yield criteria and flow rules for porous ductile media. *J. Eng. Mater. Technol.*, 44:2–15, 1977.

[HAD03] J. HADAMARD. *Leçons sur la Propagation des Ondes et les Équations de l'Hydrodynamique*. Hermann, Paris, 1903.

[HAL75] B. HALPHEN and Q.S. NGUYEN. Sur les matériaux standards généralisés. *J. Méc.*, 14:39–63, 1975.

[HAL87] B. HALPHEN and J. SALENÇON. *Élasto-plasticité*. Presses des Ponts et Chaussées, Paris, 1987.

[HAL96] F.R. HALL, D.R. HAYHURST, and P.R. BROWN. Prediction of plane-strain creep crack growth using Continuum Damage Mechanics. *Int. J. Damage Mech.*, 5(4):353–402, 1996.

[HAN92] N.R. HANSEN and H.L. SCHREYER. Thermodynamically consistent theories for elastoplasticity coupled with damage. In *Damage Mechanics and Localization*. AMD, volume 142, 53–167, ASME, New York, 1992.

[HAR92] O. HARIRÊCHE and B. LORET. 3D dynamic strain-localization: shear band pattern transition in solids. *Eur. J. Mech. A, Solids*, 11(6):735–751, 1992.

[HAS94a] T. HASSAN and S. KYRIAKIDES. Ratcheting of cyclically hardening and softening materials, part I: uniaxial behavior. *Int. J. Plast.*, 10:149–184, 1994.

[HAS94b] T. HASSAN and S. KYRIAKIDES. Ratcheting of cyclically hardening and softening materials, part I: multiaxial behavior. *Int. J. Plast.*, 10:185–212, 1994.

[HAU00] P. HAUPT. *Continuum Mechanics and Theory of Materials*. Springer, Berlin, 2000.

[HAV92] K.S. HAVNER. *Finite Plastic Deformation of Crystalline Solids*. Cambridge University Press, Cambridge, 1992.

[HAY72] D.R. HAYHURST. Creep rupture under multiaxial state of stress. *J. Mech. Phys. Solids*, 20(6):381–390, 1972.

[HAY75] D.R. HAYHURST, P.R. DIMMER, and M.W. CHERNUKA. Estimates of the creep rupture lifetime of structures using the finite element method. *J. Mech. Phys. Solids*, 23:335, 1975.

[HER90] E. HERVÉ and A. ZAOUI. Modelling the effective behaviour of non-linear matrix-inclusion composites. *Eur. J. Mech. A, Solids*, 9:505–515, 1990.

[HEU95] P. HEUILLET, P. ROUMAGNAC, and L. DUGAUTIER. Modélisation du comportement hyperélastique des élastomères. *Mécamat-Info*, 15:15–21, 1995.

[HIL58] R. HILL. A general theory of uniqueness and stability in elastic plastic solids. *J. Mech. Phys. Solids*, 6:236–249, 1958.

[HIL65] R. HILL. Continuum micro-mechanisms of elastoplastic polycrystals. *J. Mech. Phys. Solids*, 13:89–101, 1965.

[HIL66] R. HILL. Generalized constitutive relations for incremental deformation of metal crystals by multislip. *J. Mech. Phys. Solids*, 14:95–102, 1966.

[HIL72] R. HILL and J.R. RICE. Constitutive analysis of elastic–plastic crystals at arbitrary strains. *J. Mech. Phys. Solids*, 20:401–413, 1972.

[HIL89] R. HILL. *The Mathematical Theory of Plasticity*. Oxford Engineering Science Series, volume 11, 1989.

[HOM01] M. HOMMEL and O. KRAFT. Deformation behavior of thin copper films on deformable substrates. *Acta Mater.*, 49:3935–3947, 2001.

[HUE85] C. HUET. Eléments de thermomécanique des matériaux hétérogènes. In *Cours de DEA de Génie Mécanique, ENPC*, 1985.

[HUE90] C. HUET. Application of variational concepts to size effects in elastic heterogeneous bodies. *J. Mech. Phys. Solids*, 38:813–841, 1990.

[HUG80] T.J.R. HUGHES. Generalization of selective integration procedures to anisotropic and nonlinear media. *Int. J. Numer. Methods Eng.*, 15:1413–1418, 1980.

[HUG87] T.J.R. HUGHES. *The Finite Element Method: Linear Static and Dynamic Finite Element Analysis*. Prentice Hall, New York, 1987.

[HUL79] J. HULT. Continuum damage mechanics. Capabilities limitations and promises. In *Mechanisms of Deformation and Fracture*, pages 233–347. Pergamon, Oxford, 1979.

[ILC86] L.B. ILCEWICZ, M.N.L. NARASIMHAN, and J.B. WILSON. Micro and macro material symmetries in generalized continua. *Int. J. Eng. Sci.*, 24:97–109, 1986.

[JAO85] B. JAOUL. *Etude de la Plasticité et Application aux Métaux*. Dunod, Paris, 1985.

[JIA94] Y. JIANG and H. SEHITOGLU. Multiaxial cyclic ratchetting under multiple step loading. *Int. J. Plast.*, 10:849–870, 1994.

[JON77] J.J. JONAS and B.B. BAUDELET. Effect of crack and cavity generation on tensile stability. *Acta Metall.*, 25:43–50, 1977.

[JOU99] H. JOUSSET. Comportement en fatigue et relaxation à basse température d'un alliage base titane. PhD thesis, École Nationale Supérieure des Mines de Paris, 1999.

[JU89] J.W. JU. On energy-based coupled elastoplastic damage theories: constitutive modeling and computational aspects. *Int. J. Solids Struct.*, 25(7):803–833, 1989.

[KAC58] L.M. KACHANOV. Time of the rupture process under creep conditions. *Isv. Akad. Nauk. SSR, Otd. Tekh. Nauk*, 8:26–31, 1958.

[KAC80] M. KACHANOV. Continuum model of medium with cracks. *J. Eng. Mech. Div.*, 106(EM5):1039–1051, 1980.

[KAC93] M. KACHANOV. Elastic solids with many cracks and related problems. In J. HUTCHINSON and T. WU, editors, *Advances in Appl. Mech.*, volume 30, pages 259–445. Academic Press, New York, 1993.

[KAL92] S.R. KALIDINDI, C.A. BRONKHORST, and L. ANAND. Crystallographic texture evolution in bulk deformation processing of FCC metals. *J. Mech. Phys. Solids*, 40:536–569, 1992.

[KAN82] K.I. KANATANI. Plasticity theory for the kinematics of ideal granular materials. *Int. J. Eng. Sci.*, 20(1):1–13, 1982.

[KAN03] T. KANIT, S. FOREST, I. GALLIET, V. MOUNOURY, and D. JEULIN. Determination of the size of the representative volume element for random composites: statistical and numerical approach. *Int. J. Solids Struct.*, 40:3647–3679, 2003.

[KAN06] T. KANIT, F. NGUYEN, S. FOREST, D. JEULIN, M. REED, and S. SINGLETON. Apparent and effective physical properties of heterogeneous materials: representativity of samples of two materials from food industry. *Comput. Methods Appl. Mech. Eng.*, 195:3960–3982, 2006.

[KIM98] A.S. KIM, J. BESSON, and A. PINEAU. Global and local approaches to fracture normal to interfaces. *Int. J. Solids Struct.*, 36:1845–1864, 1998.

[KOC66] U.F. KOCKS and T.J. BROWN. Latent hardening in aluminium. *Acta Metall.*, 14:87–98, 1966.

[KOC98] U.F. KOCKS, C.N. TOMÉ, and H.R. WENK. *Texture and Anisotropy*. Cambridge University Press, Cambridge, 1998.

[KOI60] W.T. KOITER. In R.H.I.N. SNEDDON, editor, *General Theorems for Elastic–Plastic Solids*, volume 6, pages 167–221. North-Holland, Amsterdam, 1960.

[KOP88] J. KOPLIK and A. NEEDLEMAN. Void growth and coalescence in porous plastic solids. *Int. J. Solids Struct.*, 835–853, 1988.

[KRA81] D. KRAJCINOVIC and G.U. FONSEKA. The continuous damage theory of brittle materials, parts 1 and 2. *J. Appl. Mech.*, 48:809–824, 1981.

[KRA84] D. KRAJCINOVIC. Continuum damage mechanics. *Appl. Mech. Rev.*, 37(1):1–6, 1984.

[KRE89] W. KREHER and W. POMPE. *Internal Stresses in Heterogeneous Solids*. Akademie-Verlag, Berlin, 1989.

[KRI77] R.D. KRIEG and D.B. KRIEG. Accuracies of numerical solution for the elastic-perfectly plastic model. *J. Press. Vessel Technol.*, 99:510–515, 1977.

[KRÖ61] E. KRÖNER. Zur plastischen Verformung des Vielkristalls. *Acta Metall.*, 9:155–161, 1961.

[KRÖ76] E. KRÖNER and H. KOCH. Effective properties of disordered materials. *SM Arch.*, 1:183–238, 1976.

[KRÖ77] E. KRÖNER. Bounds for effective moduli of disordered materials. *J. Mech. Phys. Solids*, 25:137–155, 1977.

[KRÖ81] E. KRÖNER. Linear properties of random media—the systematic theory. In C. HUET and A. ZAOUI, editors, *Comportements Rhéologiques et Structure des Matériaux*, pages 15–40. Editions ENPC, Paris, 1981.

[LAD80] P. LADEVÈZE. Sur la théorie de la plasticité en grandes déformations. Rapport Interne LMT No. 9, 1980.

[LAD83] P. LADEVÈZE. Sur une théorie de l'endommagement anisotrope. Rapport Interne 34, Laboratoire de Mécanique et Technologie, Cachan, 1983.

[LAD84] P. LADEVÈZE and J. LEMAITRE. Damage effective stress in quasi-unilateral condition. IUTAM Congress, Lyngby, Danemark, 1984.

[LAD94] P. LADEVÈZE, A. GASSER, and O. ALLIX. Damage mechanics modelling for ceramic composites. *J. Eng. Mater. Technol.*, 16, 1994.

[LAD95] P. LADEVÈZE. A damage computational approach for composites: basic aspects and micromechanical relations. *Comput. Mech.*, 17:142–150, 1995.

[LAM78] H.S. LAMBA and O.M. SIDEBOTTOM. Cyclic plasticity for non-proportional paths, parts 1 and 2. *J. Eng. Mater. Technol.*, 100:96–112, 1978.

[LEB95] J.B. LEBLOND, G. PERRIN, and J. DEVAUX. An improved Gurson-type model for hardenable ductile metals. *Eur. J. Mech. A, Solids*, 14(4):499–527, 1995.

[LEC74] F.A. LECKIE and D.R. HAYHURST. Creep rupture of structures. *Proc. R. Soc. Lond.*, 340:323–347, 1974.

[LEC80] F.A. LECKIE and E.T. ONAT. Tensorial nature of damage measuring internal variables. In *Physical Non-Linearities in Structural Analysis*. Springer, Berlin, 1980.

[LEM78] J. LEMAITRE and J.-L. CHABOCHE. Aspect phénoménologique de la rupture par endommagement. *J. Méc. Appl.*, 2(3):317–365, 1978.

[LEM84] J. LEMAITRE. How to use damage mechanics. *Nucl. Eng. Des.*, 80:233–245, 1984.

[LEM85a] J. LEMAITRE. A continuum damage mechanics model for ductile fracture. *J. Eng. Mater. Technol.*, 107:83–89, 1985.

[LEM85b] J. LEMAITRE and J.-L. CHABOCHE. *Mécanique des Matériaux Solides*. Dunod, Paris, 1985.

[LEM96] J. LEMAITRE. *A Course on Damage Mechanics*. Springer, Berlin, 1996.

[LIP90] P. LIPINSKI, J. KRIER, and M. BERVEILLER. Elastoplasticité des métaux en grandes déformations : comportement global et évolution de la structure interne. *Rev. Phys. Appl.*, 25:361–388, 1990.

[LIU94] Y. LIU, S. MURAKAMI, and Y. KANAGAWA. Mesh-dependence and stress singularity in finite element analysis of creep crack growth by continuum damage mechanics approach. *Eur. J. Mech. A, Solids*, 13(3):395–417, 1994.

[LUB90] J. LUBLINER. *Plasticity Theory*. Mc Millan, New York, 1990.

[LUB93] V.A. LUBARDA and D. KRAJCINOVIC. Damage tensors and the crack density distribution. *Int. J. Solids Struct.*, 30:2859–2877, 1993.

[LUE84] D.G. LUENBERGER. *Linear and Nonlinear Programming*. Addison-Wesley, Reading, 1984.

[MAC95] D.L. MAC DOWELL. Stress state dependence of cyclic ratcheting behavior of two rail steels. *Int. J. Plast.*, 11:397–421, 1995.

[MAI96] J.-F. MAIRE and D.D. PACOU. *Essais de Traction-Compression-Torsion sur Tubes Composites Céramique-Céramique*, pages 1225–1234. AMAC, Paris, 1996.

[MAI97a] J.-F. MAIRE and J.-L. CHABOCHE. A new formulation of continuum damage mechanics for composite materials. *Aerospace Sci. Technol.*, 4:247–257, 1997.

[MAI97b] J.-F. MAIRE and P.-M. LESNE. A damage model for ceramic matrix composites. *Aerospace Sci. Technol.*, 4:259–266, 1997.

[MAL80] D.S. MALKUS. Finite elements with penalties in non linear elasticity. *Int. J. Numer. Methods Eng.*, 16:121–136, 1980.

[MAN65] J. MANDEL. Une généralisation de la théorie de la plasticité de W.T. Koiter. *Int. J. Solids Struct.*, 1:273–295, 1965.

[MAN66] J. MANDEL. *Cours de Mécanique des Milieux Continus, tomes I et II*. Gauthier-Villars, Paris, 1966 (réédition 1994, J. Gabay).

[MAN72] J. MANDEL. *Plasticité Classique et Viscoplasticité*. CISM Courses and Lectures, volume 97. Springer, Berlin, 1972.

[MAN78] J. MANDEL. *Propriétés Mécaniques des Matériaux*. Eyrolles, Paris, 1978.

[MAR89] D. MARQUIS. Phénoménologie et thermodynamique : couplage entre thermoélasticité, plasticité, vieillissement et endommagement. PhD thesis, Université Pierre et Marie Curie, Paris 6, 1989.

[MAT79] H. MATTHIES and G. STRANG. The solution of non-linear finite element equations. *Int. J. Numer. Methods Eng.*, 14:1613–1626, 1979.

[MAT94] K.K. MATHUR, A. NEEDLEMAN, and V. TVERGAARD. Ductile failure analyses on massively parallel computers. *Comput. Methods Appl. Mech. Engrg.*, 119:283–309, 1994.

[MAU80] G.A. MAUGIN. The method of virtual power in continuum mechanics: application to coupled fields. *Acta Mech.*, 35:1–70, 1980.

[MAU92] G.A. MAUGIN. *Thermomechanics of Plasticity and Fracture*. Cambridge University Press, Cambridge, 1992.

[MAZ82] J. MAZARS. Mechanical damage and fracture of concrete structures. In *Advances in Fracture Research*, volume 4, pages 1499–1506. Pergamon, Elmsford, 1982.

[MAZ86] J. MAZARS. A model of a unilateral elastic damageable material and its application to concrete. In *Fracture Toughness and Fracture Energy of Concrete*. Elsevier, Lausanne, 1986.

[MAZ89] J. MAZARS and G. PIJAUDIER-CABOT. Continuum damage theory: application to concrete. *J. Eng. Mech.*, 115(2):345–365, 1989.

[MCC66] F.A. MCCLINTOCK and A.S. ARGON. *Mechanical Behavior of Materials*. Addison-Wesley, Reading, 1966.

[MCG80] P.A. MCGUIRE, S.G. SAMPATH, C.H. POPELAR, and M.F. KANNINEN. A theoretical model for crack propagation and crack arrest in pressurized pipelines. In G.T. HAHN and M.F. KANNINEN, editors, *Crack Arrest Methodology and Applications*, pages 341–358, 1980.

[MEA85] M.E. MEAR and J.W. HUTCHINSON. Influence of yield surface curvature on flow localization in dilatant plasticity. *Mech. Mater.*, 4:395–407, 1985.

[MEN68] A. MENDELSON. *Plasticity: Theory and Application*. Macmillan, New York, 1968.

[MOL87] A. MOLINARI, G.R. CANOVA, and S. AHZI. A self-consistent approach to the large deformation polycrystal viscoplasticity. *Acta Metall.*, 35:2983–2994, 1987.

[MOR83] J.-J. MOREAU. In P. GERMAIN and B. NAYROLLES, editors, *Application of Convex Analysis to the Treatment of Elastoplastic Systems*. Springer, Swansea, 1983.

[MRÓ67] Z. MRÓZ. On the description of anisotropic work hardening. *J. Mech. Phys. Solids*, 15:163, 1967.

[MRÓ95] Z. MRÓZ, D. WEICHERT and S. DOROSZ, editors. *Inelastic Behaviour of Structures Under Variable Loads*. Kluwer Academic, Dordrecht, 1995.

[MÜH98] U. MÜHLICH and R. KIENZLER. Nonlocal modification of the Gurson-model. In A. BERTRAM and F. SIDOROFF, editors, *Euromech—Mecamat'97, 2nd European Mechanics of Materials Conference on Mechanics of Materials with Intrinsic Length Scale: Physics, Experiments, Modelling and Applications*, pages 277–284, 1998.

[MUN94] E. MUNIER. Identification expérimentale et modélisation statistique multi-échelle du comportement mécanique de composites SiC/SiC tissés. PhD thesis, École Nationale Supérieure des Mines de Paris, 1994.

[MUR80] S. MURAKAMI and N. OHNO. A continuum theory of creep and creep damage. In A.R.S. PONTER and D.R. HAYHURST, editors, *3rd Creep in Structures Symposium*, Leicester, pages 422–443. Springer, Berlin, 1980.

[MUR83a] S. MURAKAMI. Notion of continuum damage mechanics and its application to anisotropic creep damage theory. *J. Eng. Mater. Technol.*, 105:99, 1983.

[MUR83b] A.I. MURDOCH. On material frame-indifference, intrinsic spin and certain constitutive relations motivated by the kinetic theory of gases. *Arch. Ration. Mech. Anal.*, 83:185–194, 1983.

[MUR87] T. MURA. *Micromechanics of Defects in Solids*. Martinus Nijhoff, Dordrecht, 1987.

[MUR03] A.I. MURDOCH. Objectivity in classical continuum physics: a rationale for discarding the 'principle of invariance under superposed rigid body motions' in favour of purely objective considerations. *Contin. Mech. Thermodyn.*, 15:309–320, 2003.

[NAG74] J.C. NAGTEGALL, D.M. PARKS, and J.R. RICE. On numerically accurate finite element solutions in the fully plastic range. *Comput. Methods Appl. Mech. Eng.*, 4:153–177, 1974.

[NEE90] A. NEEDLEMAN. An analysis of decohesion along an imperfect interface. *Int. J. Fract.*, 42:21–40, 1990.

[NEM80] S. NEMAT-NASSER and A. SHOKOOH. On finite plastic flow of compressible materials with internal friction. *Int. J. Solids Struct.*, 16:495–514, 1980.

[NEM98] S. NEMAT-NASSER and Y. LI. Flow stress of FCC polycrystals with application to OFHC Cu. *Acta Mater.*, 46(2):565–577, 1998.

[NGU77] Q.S. NGUYEN. On the elastic–plastic initial boundary problem and its numerical integration. *Int. J. Numer. Methods Eng.*, 11:817–832, 1977.

[NOU90] D. NOUAILHAS. Un modèle de viscoplasticité cyclique pour matériaux anisotropes à symétrie cubique. *C. R. Acad. Sci. Paris, Sér. II*, 310:887–890, 1990.

[NOU92] D. NOUAILHAS and G. CAILLETAUD. Comparaison de divers critères anisotropes pour monocristaux cubiques à faces centrées (CFC). *C. R. Acad. Sci. Paris, Sér. II*, 315:1573–1579, 1992.

[NOU94] D. NOUAILHAS, J.-P. CULIÉ, G. CAILLETAUD, and L. MÉRIC. FE analysis of the stress-strain behaviour of single-crystal tubes. *Eur. J. Mech. A, Solids*, 14(1):137–154, 1994.

[NOU95] D. NOUAILHAS and G. CAILLETAUD. Tension-torsion behavior of single-crystal superalloys: experiment and finite element analysis. *Int. J. Plast.*, 11(4):451–470, 1995.

[NYG03] M. NYGÅRDS. Number of grains necessary to homogenize elastic materials with cubic symmetry. *Mech. Mater.*, 35:1049–1057, 2003.

[ODE72] J.T. ODEN. *Finite Elements on Nonlinear Continua*. McGraw-Hill, New York, 1972.

[ODE78] J.T. ODEN. A theory of penalty methods for finite element approximations of highly nonlinear problems in continuum mechanics. *Comput. Struct.*, 8:445–449, 1978.

[ODE83] J.T. ODEN and G. CAREY. *Finite Elements, volume IV: Mathematical Aspects*. Prentice-Hall, Englewood Cliffs, 1983.

[OGD97] R.W. OGDEN. *Non-Linear Elastic Deformations*. Dover, New York, 1984–1997.

[OHA83] Y. OHASHI, M. KAWAI, and T. MOMOSE. Effect of prior plasticity on subsequent creep of type 316 stainless steel at elevated temperature. *J. Eng. Mater. Technol.*, 105:257–263, 1983.

[OHN93a] N. OHNO and J.D. WANG. Kinematic hardening rules with critical state for the activation of dynamic recovery, part I: formulation and basic features for ratchetting behaviour. *Int. J. Plast.*, 9:375–390, 1993.

[OHN93b] N. OHNO and J.D. WANG. Kinematic hardening rules with critical state for the activation of dynamic recovery, part II: application to experiments of ratchetting behaviour. *Int. J. Plast.*, 9:390–403, 1993.

[ORT85a] M. ORTIZ. A constitutive theory for the inelastic behavior of concrete. *Mech. Mater.*, 4:67–93, 1985.

[ORT85b] M. ORTIZ and E.P. POPOV. Accuracy and stability of integration algorithms for elastoplastic constitutive equations. *Int. J. Numer. Methods Eng.*, 21:1561–1576, 1985.

[PAR04] R. PARISOT, S. FOREST, A. PINEAU, F. GRILLON, X. DÉMONET, and J.-M. MATAIGNE. Deformation and damage mechanisms of zinc coatings on galvanized steel sheets, part I: deformation modes. *Metall. Mater. Trans.*, 35A:797–811, 2004.

[PEE96] R.H.J. PEERLINGS, R. DE BORST, W.A.M. BREKELMANS, J.H.P. DE VREE, and I. SPEE. Some observations on localisation in non-local and gradient damage models. *Eur. J. Mech. A, Solids*, 15(6), 1996.

[PEE04] R.H.J. PEERLINGS, T.J. MASSART, and M.G.D. GEERS. A thermodynamically motivated implicit gradient damage framework and its application to brick masonry cracking. *Comput. Methods Appl. Mech. Engrg.*, 193:3403–3417, 2004.

[PIE85] D. PIERCE, R.J. ASARO, and A. NEEDLEMAN. Material rate dependence and localized deformation in crystalline solids. *Acta Metall.*, 31:1951, 1985.

[PIL90a] P. PILVIN. Approches multiéchelles pour la prévision du comportement inélastique des métaux. PhD thesis, Université Pierre et Marie Curie, Paris 6, 1990.

[PIL90b] P. PILVIN and G. CAILLETAUD. Intergranular and transgranular hardening in viscoplasticity. In M. ZYCZKOWSKI, editor, *Creep in Structures*, volume 4, pages 171–178, 1990.

[PIL94] P. PILVIN. The contribution of micromechanical approaches to the modelling of inelastic behaviour. In A. PINEAU, G. CAILLETAUD and T. LINDLEY, editors, *4th International Conference on Biaxial/Multiaxial Fatigue*, Saint-Germain, France, 31 May–3 June 1994, volume 1, pages 31–46. ESIS, Paris, 1994.

[PIN76] A. PINEAU. Influence of uniaxial stress on the morphology of coherent precipitates during coarsening—elastic energy considerations. *Acta Metall.*, 24:559–564, 1976.

[PIN81] A. PINEAU. Review of fracture mechanisms and local approaches to predicting crack resistance in low strength steels. In D. FRANÇOIS et al., editor, *International Conference of Fracture, Advances in Fracture Researches*. Pergamon, Elmsford, 1981.

[PLU86] A. PLUMTREE and J.O. NILSSON. Damage mechanics applied to high temperature fatigue. In *Journées Internationales de Printemps, Fatigue at High Temperature*, Paris, 1986.

[POI96] N. POINT and E. SACCO. A delamination model for laminated composites. *Int. J. Solids Struct.*, 33(4):483–509, 1996.

[PON98] P. PONTE CASTAÑEDA and P. SUQUET. Nonlinear composites. *Adv. Appl. Mech.*, 34:171–302, 1998.

[PRA98] F. PRAT, M. GRANGE, J. BESSON, and E. ANDRIEU. Behavior and rupture of hydrided zircaloy-4 tubes and sheets. *Metall. Trans.*, 29A:1643–1651, 1998.

[PRE88] W.H. PRESS, R.O. FOSCHI, S.A. TEUKOLSKY, and W.T. VETTERLING. *Numerical Recipes in C*. Cambridge University Press, Cambridge, 1988.

[RAB69] Y.N. RABOTNOV. *Creep Problems in Structural Members*. North-Holland, Amsterdam, 1969.

[RAM90] S. RAMTANI. Contribution à la modélisation du comportement multiaxial du béton endommagé avec description du caractère unilatéral, Thèse de doctorat, Université Pierre et Marie Curie, Paris 6, 1990.

[REN02] Z.-Y. REN and Q.-S. ZHENG. A quantitative study of minimum sizes of representative volume elements of cubic polycrystals-numerical experiments. *J. Mech. Phys. Solids*, 50:881–893, 2002.

[RIC68] J.R. RICE. A path independent integral and the approximate analysis of strain concentration by notched and cracks. *J. Appl. Mech.*, 35:379, 1968.

[RIC69] J.R. RICE and D.M. TRACEY. On the enlargement of voids in triaxial stress fields. *J. Mech. Phys. Solids*, 17:201–217, 1969.

[RIC70] J.R. RICE. On the structure of stress-strain relations for time-dependent plastic deformation in metals. *J. Appl. Mech.*, 37:728, 1970.

[RIC71] J.R. RICE. Inelastic constitutive relations for solids: an internal variable theory and its application to metal plasticity. *J. Mech. Phys. Solids*, 19:433–455, 1971.

[RIC73] J.R. RICE and D.M. TRACEY. Computational fracture mechanics. In S.J. FENVES, editor, *Symposium on Numerical Methods in Structural Mechanics*, Urbana, IL. Academic Press, New York, 1973.

[RIC76] J.R. RICE. The localization of deformation. In W.T. KOITER, editor, *Theoretical and Applied Mechanics*. North Publishing Company, Philadelphia, 1976.

[RIK79] E. RIKS. An incremental approach to the solution of snapping and buckling problems. *Int. J. Solids Struct.*, 15:529–551, 1979.

[RIV69] R.S. RIVLIN. Red herrings and sundry unidentified fish in non-linear mechanics. Technical Report No. CAM-100-9, Centre for the Application of Mathematics, Lehigh University, 1969.

[ROU85a] G. ROUSSELIER, J.-J. ENGEL, and J.C. MASSON. Etude comparative de modèles de comportement pour la simulation d'essais en traction-pression sur tubes en acier inoxydable. Technical Report 8, EDF-DER/GIS Rupture à Chaud, 1985.

[ROU85b] M. ROUSSET. Surface seuil de plasticité : détermination automatique et modélisation. PhD thesis, Université Pierre et Marie Curie, Paris 6, 1985.

[ROU87] G. ROUSSELIER. Ductile fracture models and their potential in local approach of fracture. *Nucl. Eng. Des.*, 105:97–111, 1987.

[ROU97] P. ROUGÉE. *Mécanique des Grandes Transformations*. Springer, Berlin, 1997.

[RUN89] K. RUNESSON and Z. MRÓZ. A note on non-associated flow rules. *Int. J. Plast.*, 5:639–658, 1989.

[SAA88] K. SAANOUNI. Sur l'analyse de la fissuration des milieux élasto-viscoplastiques par la théorie de l'endommagement continu. Doctorat d'Etat, Université de Technologie de Compiègne, 1988.

[SAA89] K. SAANOUNI, J.-L. CHABOCHE, and P.-M. LESNE. On the creep crack growth prediction by a nonlocal damage formulation. *Eur. J. Mech. A, Solids*, 8(6):437–459, 1989.

[SAA92] K. SAANOUNI and P.-M. LESNE. Sur la description phénoménologique des déformations anélastiques dans les composites endommageables. *C. R. Acad. Sci. Paris, Sér. II*, 315:1165–1170, 1992.

[SAB92] K. SAB. On the homogenization and the simulation of random materials. *Eur. J. Mech. A, Solids*, 11:505–515, 1992.

[SAI95] K. SAI and G. CAILLETAUD. Study of plastic/viscoplastic models with various inelastic mechanisms. *Int. J. Plast.*, 11(8):991–1005, 1995.

[SAL84] J. SALENÇON. *Viscoélasticité*. Presses des Ponts et Chaussées, Paris, 1984.

[SCH65] A. SCHOFIELD and P. WROTH. *Critical States Soil Mechanics*. McGraw-Hill, New York, 1965.

[SCH79] H.L. SCHREYER, R.L. KULAK, and J.M. KRAMER. Accurate numerical solutions for elastic–plastic models. *J. Press. Vessel Technol.*, 101:226–234, 1979.

[SHA93] G.X. SHAN, O. KOLEDNIK, F.D. FISHER, and H.P. STÜWE. A 2D model for numerical investigations of stable crack growth in thick smooth fracture mechanics specimens. *Eng. Fract. Mech.*, 45(1), 1993.

[SHI76] S. SHIMA and M. OYANE. Plasticity theory for porous metals. *Int. J. Mech. Sci.*, 18:285–291, 1976.

[SID96] F. SIDOROFF. Formalisme grandes déformations en hyperélasticité et viscoélasticité. In G. CAILLETAUD, editor, *Colloque National Mécamat Aussois*, 1996.

[SIE92] R. SIEVERT. Eine Systematik für elastisch-plastische Stoffgleichungen. PhD thesis, Dissertation, Schriftenreihe Phys. Ing.-Wiss., Band 23, TU Berlin, 1992.

[SIE98a] T. SIEGMUND and W. BROCKS. Tensile decohesion by local failure criteria. *Tech. Mech.*, 18(4):261–270, 1998.

[SIE98b] R. SIEVERT, S. FOREST, and R. TROSTEL. Finite deformation Cosserat-type modelling of dissipative solids and its application to crystal plasticity. *J. Phys. IV*, 8:Pr8-357–Pr8-364, 1998.

[SIM85a] J.C. SIMO and R.L. TAYLOR. Consistent tangent operators for rate independent elasto-plasticity. *Comput. Methods Appl. Mech. Eng.*, 48:101–118, 1985.

[SIM85b] J.C. SIMO, R.L. TAYLOR, and K.S. PISTER. Variational and projection methods for the volume constraint in finite deformation elastoplasticity. *Comput. Methods Appl. Mech. Eng.*, 51:177–208, 1985.

[SIM86] J.C. SIMO and R.L. TAYLOR. Return mapping algorithm for plane stress elastoplasticity. *Int. J. Numer. Methods Eng.*, 22:649–670, 1986.

[SIM87] J.C. SIMO and J.W. JU. Strain- and stress-based continuum damage models, I: formulation. *Int. J. Solids Struct.*, 23(7):821–840, 1987.

[SIM91] J.C. SIMO and S. GOVINDJEE. Nonlinear B-stability and symmetry preserving return mapping algorithms for plasticity and viscoplasticity. *Int. J. Numer. Methods Eng.*, 31:151–176, 1991.

[SIM97] J.C. SIMO and T.R.J. HUGHES. *Computational Inelasticity*. Springer, Berlin, 1997.

[SIQ93] C. SIQUIERA. Développement d'un essai biaxial sur plaques composites et utilisation pour la modélisation du comportement d'un matériau SMC. PhD, Université de Franche-Comté, 1993.

[SKR98] J. SKRZYPEK and A. GANCZARSKI. *Modeling of Material Damage and Failure of Structures*. Springer, Berlin, 1998.

[STA98] A. STAROSELSKI and L. ANAND. Inelastic deformation of polycrystalline face centered cubic materials by slip and twinning. *J. Mech. Phys. Solids*, 46(4):671–696, 1998.

[STE97] A.C. STEENBRINK, E. VAN DER GIESSEN, and P.D. WU. Void growth in glassy polymers. *J. Mech. Phys. Solids*, 45(3):405–437, 1997.

[SUO92] Z. SUO, M. ORTIZ, and A. NEEDLEMAN. Stability of solids with interfaces. *J. Mech. Phys. Solids*, 40:613–640, 1992.

[SUQ97] P. SUQUET, editor. *Continuum Micromechanics*. CISM Courses and Lectures, volume 377. Springer, Berlin, 1997.

[SZA87] I. SZABO. *Geschichte der mechanischen Prinzipien*. Birkhäuser, Basel, 1987.

[TAB97] L. TABOUROT, M. FIVEL, and E. RAUCH. Generalised constitutive laws for FCC single crystals. *Mater. Sci. Eng. A*, 234–236:639–642, 1997.

[TAH99] S. TAHERI and E. LORENTZ. An elastic–plastic constitutive law for the description of uniaxial and multiaxial ratchetting. *Int. J. Plast.*, 15:1159–1180, 1999.

[TAL85] R. TALREJA. A continuum mechanics characterization of damaged composite materials. *Proc. R. Soc. Lond.*, 195–216, 1985.

[TAN70] K. TANAKA and T. MORI. The hardening of crystals by non-deforming particles and fibres. *Acta Metall.*, 18:931–941, 1970.

[TAY38a] G.I. TAYLOR. *Analysis of Plastic Strain in a Cubic Crystal*, pages 218–224. Mc Millan, New York, 1938.

[TAY38b] G.I. TAYLOR. Plastic strain in metals. *J. Inst. Met.*, 62:307–324, 1938.

[TEO76] C. TEODOSIU and F. SIDOROFF. A theory of finite elastoviscoplasticity of single crystals. *Int. J. Eng. Sci.*, 14:165–176, 1976.

[TEO93] C. TEODOSIU, J.-L. RAPHANEL, and L. TABOUROT. Finite element simulation of the large elastoplastic deformation of multicrystals. In C. TEODOSIU, J.-L. RAPHANEL and F. SIDOROFF, editors, *5th MECAMAT International Seminar on Large Plastic Deformations: Fundamental Aspects and Applications to Metal Forming*, Fontainebleau, France, pages 153–168. Balkema, Rotterdam, 1993.

[TEO97] C. TEODOSIU, editor. *Constitutive Modeling of Polycrystalline Metals at Large Strains*. CISM Courses and Lectures, volume 376. Springer, Berlin, 1997.

[TOU93] G. TOUZOT and J. DABOUNOU. Intégration numérique de lois de comportement élastoplastique. *Rev. Eur. Élém. Finis*, 2(4):465–494, 1993.

[TRI96] N. TRIANTAFYLLIDIS and S. BARDENHAGEN. The influence of scale size on the stability of periodic solids and the role of associated higher order gradient continuum models. *J. Mech. Phys. Solids*, 44:1891–1928, 1996.

[TRO93] R. TROSTEL. *Vektor- und Tensor-Algebra. Mathematische Grundlagen der technischen Mechanik. I: Beiträge zur theoretischen Mechanik*, Vieweg, Wiesbaden, 1993.

[TRU60] C. TRUESDELL and R. TOUPIN. The classical field theories. In S. FLÜGGE, editor, *Handbuch der Physik*, volume 3.1. Springer, Berlin, 1960.

[TRU65] C. TRUESDELL and W. NOLL. The non-linear field theories of mechanics. In S. FLÜGGE, editor, *Handbuch der Physik*. Springer, Berlin, 1965 (reedited in 2005).

[TVE84] V. TVERGAARD and A. NEEDLEMAN. Analysis of cup-cone fracture in a round tensile bar. *Acta Metall.*, 32:157–169, 1984.

[TVE90a] V. TVERGAARD. Effect of fibre debonding in a whisker-reinforced metal. *Mater. Sci. Eng.*, A125:203–213, 1990.

[TVE90b] V. TVERGAARD. Material failure by void growth to coalescence. *Adv. Appl. Mech.*, 27:83–151, 1990.

[VAK71] A.A. VAKULENKO and M.L. KACHANOV. Continuum theory of medium with cracks. *Mech. Solids*, 6(4):145–151, 1971 (English transl. of Mekhanika Tverdogo Tela (in Russian)).

[VER83] P.A. VERMEER. Frictional slip and non-associated plasticity. *Scand. J. Metall.*, 12:268–276, 1983.

[VOY93] G.Z. VOYIADJIS and P. KATTAN. Damage of fiber reinforced composite materials with micromechanical characterization. *Int. J. Solids Struct.*, 30(20):2757–2778, 1993.

[WIL64] M.L. WILKINS. *Calculation of Elastic–Plastic Flow*. Academic Press, New York, 1964.

[WIL02] A. WILKSTRÖM and M. NYGÅRDS. Anisotropy and texture in thin copper films—an elastoplastic analysis. *Acta Mater.*, 50:857–870, 2002.

[XIA95] L. XIA, C.F. SHIH, and J.W. HUTCHINSON. A computational approach to ductile crack growth under large scale yielding conditions. *J. Mech. Phys. Solids*, 43(3):389–413, 1995.

[YOD84] P.J. YODER and R.L. WHIRLEY. On the numerical implementation of elastoplastic models. *J. Appl. Mech.*, 51(2):283–287, 1984.

[Z-01] Z-SET PACKAGE. www.nwnumerics.com, www.mat.ensmp.fr, 2001.

[ZAO85] A. ZAOUI. Approximate statistical modelling and applications. In E. SANCHEZ-PALENCIA and A. ZAOUI, editors, *Homogenization Techniques for Composite Media*. Lecture Notes in Physics, volume 272, pages 337–397. Springer, Berlin, 1985.

[ZAO93a] A. ZAOUI. *Matériaux Hétérogènes*. Cours de l'Ecole Polytechnique, 1993.

[ZAO93b] A. ZAOUI and J.L. RAPHANEL. On the nature of the intergranular accommodation in the modelling of elastoviscoplastic behaviour of polycrystalline aggregates. In J.L. RAPHANEL, C. TEODOSIU and F. SIDOROFF, editors, *5th MECAMAT International Seminar on Large Plastic Deformations*, pages 27–38. Balkema, Rotterdam, 1993.

[ZAR87] J. ZARKA. Systematic structural modeling of metals. In J. GITTUS and J. ZARKA, editors, *Modelling Small Deformations of Polycrystals*, pages 374–410. Elsevier, Amsterdam, 1987.

[ZHA95] Z.L. ZHANG and E. NIEMI. A new failure criterion for the Gurson–Tvergaard dilational constitutive model. *Int. J. Fract.*, 70:321–334, 1995.

[ZHU95] Y.Y. ZHU and S. CESCOTTO. Fully coupled elasto-visco-plastic damage theory for anisotropic materials. *Int. J. Solids Struct.*, 32(11):1607–1641, 1995.

[ZIE96] J. ZIEBS, J. BRESSERS, H. FRENZ, D.R. HAYHURST, H. KLINGELHÖFFER, and S. FOREST. *International Symposium on Local Strain and Temperature Measurements in Non-uniform Fields at Elevated Temperatures*. Woodhead, Berlin, 1996.

[ZIE00] O.C. ZIENKIEWICZ and R.L. TAYLOR. *The Finite Element Method, volumes I–III*. Butterworth-Heinemann, Stoneham, 2000.

Index

J. Besson et al., *Non-Linear Mechanics of Materials*,
Solid Mechanics and Its Applications 167,
DOI 10.1007/978-90-481-3356-7,