**INTERNATIONAL UNION OF THEORETICAL
AND APPLIED MECHANICS**

**IRREVERSIBLE ASPECTS
OF CONTINUUM MECHANICS
AND
TRANSFER OF PHYSICAL
CHARACTERISTICS IN MOVING FLUIDS**

SYMPOSIA VIENNA, JUNE 22—28, 1966

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VIENNA

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MOSCOW

WITH 87 FIGURES

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Preface

At its meeting on April 23, 1965 in Paris the Bureau of IUTAM decided to have a Symposium on the Irreversible Aspects of Continuum Mechanics held in June 1966 in Vienna. In addition, a Symposium on the Transfer of Physical Characteristics in Moving Fluids which, originally, had been scheduled to take place in Stockholm was rescheduled to be held in Vienna immediately following the Symposium on the Irreversible Aspects of Continuum Mechanics. It was felt that the subjects of the two symposia were so closely related that participants should be given an opportunity to attend both.

Both decisions were unanimously approved by the members of the General Assembly of IUTAM. Prof. H. PARKUS, Vienna, was appointed Chairman of the Symposium on the Irreversible Aspects, and Prof. L. I. SEDOV, Moscow, was appointed Chairman of the Symposium on the Transfer of Physical Characteristics, with Prof. PARKUS being responsible for the local organization of both symposia.

In accordance with the policy set forth by IUTAM, membership of the Symposia was limited and by invitation only. Financial support for covering the costs of organization and for a partial defrayal of the accomodation and traveling expenses of the participants was provided by IUTAM and by the Austrian Ministry of Education.

The Scientific Committee of the Symposium on the Irreversible Aspects of Continuum Mechanics consisted of the following members:

Prof. H. PARKUS, Vienna, Chairman

Prof. S. R. DE GROOT, Amsterdam

Prof. F. K. G. ODQVIST, Stockholm

Prof. W. OLSZAK, Warsaw

Prof. W. PRAGER, Providence, R. I.

Prof. M. ROY, Paris

Prof. L. I. SEDOV, Moscow

Prof. H. ZIEGLER, Zürich

(Prof. DE GROOT was unable to attend the Symposium)

The primary purpose of the Symposium was to bring together leading scientists from the fields of Continuum Mechanics and Thermodynamics. Of these two fields which, in the past, have developed more or less inde

pendently Continuum Mechanics has now reached a stage where further progress appears impossible without the inclusion of thermodynamic concepts. Emphasis was on the basic concepts in both fields, and not on applications. 23 papers were presented. Discussions were unusually lively and highly fruitful. Although unification of the two main schools of thought still seems to be a matter of the distant future, considerable progress has been made at the Symposium towards closing the gap.

The Scientific Committee of the Symposium on the Transfer of Physical Characteristics in Moving Fluids consisted of

Prof. L. I. SEDOV, Moscow, Chairman
Prof. H. PARKUS, Vienna, Vice-Chairman
Prof. S. B. BERNDT, Stockholm
Prof. S. R. DE GROOT, Amsterdam
Prof. H. W. LIEPMANN, Pasadena
Prof. M. J. LIGHTHILL, London
Prof. M. ROY, Paris

A free and sapid discussion followed the presentation of the papers.

Vienna and Moscow, September 1967

H. Parkus, L. I. Sedov

Sessions

Wednesday, June 22, 1966

Chairman: B. R. SETH

- L. I. SEDOV: Variational methods of constructing models of continuous media.
D. C. DRUCKER: On the continuum as an assemblage of homogeneous elements or states.

Chairman: U. UHLHORN

- H. ZIEGLER: A possible generalization of Onsager's theory.
C. TRUESDELL: Thermodynamics for beginners.

Chairman: P. M. NAGHDI

- B. D. COLEMAN¹: Thermodynamics and wave propagation in non-linear materials with memory.
W. OLSZAK²: On thermodynamics of the differential type material.
S. KALISKI: Čerenkov generation of thermal waves for the wave equations of thermo-electro-magneto-elasticity.

Thursday, June 23, 1966

Chairman: J. HULT

- E. T. ONAT: The notion of state and its implications in thermodynamics of inelastic solids.
J. MEIXNER: TIP has many faces.

Chairman: G. A. KLUITENBERG

- J. F. BESSELING: A thermodynamic approach to rheology.

Chairman: A. M. FREUDENTHAL

- M. REINER: The influence of dissipated stresswork on the rupture of materials.
J. KESTIN: On the application of the principles of thermodynamics to strained solid materials.
R. S. RIVLIN³: Generalized continuum mechanics.

Friday, June 24, 1966

Chairman: D. C. DRUCKER

- W. PRAGER: Composite stress-strain relations for elastoplastic solids.
E. H. LEE⁴: Finite strain elastic-plastic theory.

¹ Jointly with M. E. GURTIN.

² Jointly with P. PERZYNA.

³ Jointly with A. E. GREEN.

⁴ Jointly with D. T. LIU.

Chairman: J. KESTIN

- P. M. NAGHDI¹: A thermodynamic development of elastic-plastic continua.
G. S. SHAPIRO: On conditions of yielding and fracture for viscoelastic-plastic bodies.

Chairman: S. KALISKI

- A. M. FREUDENTHAL²: Accumulation of second-order strain in workhardening media.
W. NOWACKI: Couple-stresses in the theory of thermoelasticity.
G. HERRMANN³: On stress waves in viscoelastic media conducting heat.

Saturday, June 25, 1966

Chairman: E. H. LEE

- YU. N. RABOTNOV: Kinetics of creep and creep rupture.
U. UHLHORN: Thermomechanics of a continuous system with internal structure.
J. HULT: Phenomenological aspects of creep irreversibility.

Monday, June 27, 1966

Chairman: S. B. BERNDT

- B. R. SETH: Irreversible transition in continuum mechanics.
YU. P. LUNKIN: Vibrational dissociation relaxation in a multicomponent mixture of viscous heat-conducting gases.

Chairman: N. FRÖSSLING

- V. N. NIKOLAEVSKII: Transfer phenomena in fluid-saturated porous media.

Tuesday, June 28, 1966

Chairman: M. J. LIGHTHILL

- F. N. FRENKIEL⁴: Joint probability density distributions in a turbulent flow.
J. ZEMÁNEK: Die Beeinflussung der Intensität des Transportprozesses durch das dynamische Verhalten der Phasengrenze Flüssigkeit-Gas oder Flüssigkeit-Dampf.

¹ Jointly with A. E. GREEN.

² Jointly with MARIA RONAY.

³ Jointly with J. D. ACHENBACH and S. M. VOGEL.

⁴ Jointly with P. S. KLEBANOFF.

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Contents

	Page
ACHENBACH, J. D., S. M. VOGEL and G. HERRMANN: On Stress Waves in Visco-elastic Media Conducting Heat	1
BESSELING, J. F.: A Thermodynamic Approach to Rheology (With 1 Figure)	16
COLEMAN, B. D., and M. E. GURTIN: Thermodynamics and Wave Propagation in Non-Linear Materials with Memory	54
DRUCKER, D. C.: On the Continuum as an Assemblage of Homogeneous Elements or States (With 9 Figures)	77
FRENKIEL, F. N., and P. S. KLEBANOFF: Joint Probability Density Distributions in a Turbulent Flow	94
FREUDENTHAL, A. M., and MARIA RONAY: Accumulation of Second-Order Strain in Workhardening Media (With 24 Figures)	97
GREEN, A. E., and P. M. NAGHDI: A Thermodynamic Development of Elastic-Plastic Continua	117
GREEN, A. E., and R. S. RIVLIN: Generalized Continuum Mechanics	132
HULT, J.: Phenomenological Aspects of Creep Irreversibility (With 10 Figures)	146
KALISKI, S.: Čerenkov Generation of Thermal Waves for the Wave Equations of Thermo-Electro-Magneto-Elasticity	159
KESTIN, J.: On the Application of the Principles of Thermodynamics to Strained Solid Materials (With 15 Figures)	177
LEE, E. H., and D. T. LIU: Finite Strain Elastic-Plastic Theory (With 2 Figures)	213
LIGHTHILL, M. J.: Application of Variational Methods in the Non-Linear Theory of Dispersive Wave Propagation	223
LUNKIN, YU. P.: Vibrational Dissociation Relaxation in a Multicomponent Mixture of Viscous Heat-Conducting Gases (With 6 Figures)	229
MEIXNER, J.: TIP Has Many Faces	237
NIKOLAEVSKII, V. N.: Transfer Phenomena in Fluid-Saturated Porous Media	250
NOWACKI, W.: Couple-Stresses in the Theory of Thermoelasticity	259
OLSZAK, W., and P. PERZYNA: On Thermodynamics of the Differential Type Material	279
ONAT, E. T.: The Notion of State and Its Implications in Thermodynamics of Inelastic Solids	292
PRAGER, W.: Composite Stress-Strain Relations for Elastoplastic Solids (With 6 Figures)	315
RABOTNOV, YU. N.: Kinetics of Creep and Creep Rupture	326
REINER, M.: The Influence of Dissipated Stresswork on the Rupture of Materials (With 3 Figures)	335

	Page
SEDOV, L. I.: Variational Methods of Constructing Models of Continuous Media	346
SETH, B. R.: Irreversible Transition in Continuum Mechanics	359
SHAPIRO, G. S.: On Conditions of Yielding and Fracture for Viscoelastic-Plastic Bodies	367
TRUESDELL, C.: Thermodynamics for Beginners	373
UHLHORN, U.: Thermomechanics of a Continuous System with Internal Struc- ture	390
ZEMÁNEK, J.: Die Beeinflussung der Intensität des Transportprozesses durch das dynamische Verhalten der Phasengrenze Flüssigkeit-Gas oder Flüssig- keit-Dampf (Mit 6 Abbildungen)	394
ZIEGLER, H.: A Possible Generalization of Onsager's Theory (With 5 Figures)	411