



Ernst Melan-Lectures

In October 2016, the Institute for Mechanics of Materials and Structures (IMWS), the Department of Civil Engineering, and the Center for Geometry and Computational Design at Vienna University of Technology have established a new Distinguished Lecture Series in the Engineering Sciences, named Ernst Melan-Lectures.

Ernst Melan (* 1890, in Brünn/Brno, † 1963, in Vienna) was a pioneer of engineering mechanics in the 1st half of the 20th century. As professor of elasticity theory, structural mechanics, and building construction at TU Wien from 1925 to 1962, he has sustainably shaped the culture of teaching and research at this university, where he has also held the positions of department head („Dekan“) and president („Rektor“). Among his numerous contributions to the engineering sciences, his shake-down theorem, as of 1936, and his general treatise of elastoplasticity, as of 1938, both anticipating many ideas which were hardly discussed before the 1950s, are true landmarks in the history of theoretical and applied mechanics.

We are pleased to announce that the Second Ernst Melan Lecture at TU Wien

will be given

by

Prof. Kumbakonam RAJAGOPAL

Distinguished Professor, Department of Mechanical Engineering,
Texas A&M University
College Station, TX 77843-3127, USA
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Prof. Rajagopal will talk about

The mechanics and mathematics of bodies described by implicit constitutive equations

on

March 13th, 2019; 2:00 p.m.

**Technische Universität Wien, Karlsplatz 13, 1040 Vienna
HS 13 Ernst Melan (7th Staircase, Second Floor)**

The mechanics and mathematics of bodies described by implicit constitutive equations

K. R. Rajagopal
Distinguished Professor
Department of Mechanical Engineering
Texas A&M University
College Station, TX-77843

Abstract: After discussing the rationale and the need for the development of implicit constitutive relations, both from philosophical and pragmatic viewpoints, to describe the response of both non-linear fluids and solids, I will discuss applications wherein they can be gainfully exploited. It will be shown that such implicit relations can explain phenomena that have hitherto defied adequate explanation such as fracture and the movement of cracks in solids, and such models have the potential to describe the response of fluids with properties that depend both on the invariants of the stress and appropriate kinematical variables. The models also provide a new way to look at turbulence in fluids. Implicit models also provide a framework for describing important problems concerning the flow of non-linear fluids through porous media due to high pressure gradients. Moreover, such implicit constitutive relations lead to governing equations that possess characteristics which are desirable both from the point of view of qualitative mathematical and numerical analysis.



K. R. Rajagopal

Education:

Ph.D. in Mechanics, University of Minnesota (Minneapolis, MN), August 1978

M.S. in Aerospace & Mechanical Engineering, Illinois Institute of Technology (Chicago, IL), June 1974

B. Tech. (5-Year Program in Mechanical Engineering) First Class, Indian Institute of Technology (Madras, Chennai, India), May 1973

Employment History:

2015- to date, Fellow, Michael E. Debakey Institute, Texas A&M University, College Station

2008-to date Regents Professor, Texas A & M University, College Station

2003-to date University Distinguished Professor, Texas A & M University

2008- to date Professor of Chemical Engineering, Texas A & M University

2003- to date Professor of Civil Engineering, Texas A & M University

2003-to date Senior Research Scientist, Texas Transportation Institute

1998-to date Professor of Biomedical Engineering, Texas A&M University

1997- to date Professor of Mathematics, Texas A & M University

1996- to date Forsyth Chair and Professor, Dept. of Mech. Eng., Texas A&M University

1994-1996 Professor of Surgery, School of Medical & Health Sciences, University of Pittsburgh

1990-1996 Affiliate Member, School of Medical & Health Sciences, University of Pittsburgh

1990 -1996 James T. MacLeod Professor of Engineering, University of Pittsburgh

1986 -1996 Professor, Department of Mathematics & Statistics, University of Pittsburgh

1985 -1996 Professor, Department of Mechanical Engineering, University of Pittsburgh

1983 -1985 Associate Professor, Dept. of Mech. Eng., University of Pittsburgh

1982 -1983 Assistant Professor, Dept. of Mech. Eng., University of Pittsburgh

1980 - 1982 Assistant Professor, Dept. of Mech. Eng., University of Pittsburgh

Honors and Awards

- 1) CVET Most Cited Article Award, jointly awarded by the Biomedical Engineering Society and Springer Nature (J. Moore and J. Soares co-authors), 2016.
- 2) Identified as being in the top 3% of their discipline, using Academic Analytics standard index scoring, 2016.
- 3) President's award for Distinguished Visitors, Ben Gurion University, Beer Sheva, Israel, 2016.
- 4) 3 issues of Mathematics and Mechanics of Solids in honor of K. R. Rajagopal's contributions to the field of Mechanics (Guest ed. J. Casey), 2015
- 5) Professor of Eminence, Texas A&M University, Qatar, January 2015
- 6) TUS President's Award, Tokyo University of Science, Tokyo, Japan, April 18, 2014
- 7) Honoris Causa, Technical University "Gheorghe Asachi", Iasi, Romania, April 19, 2013
- 8) James Bell Memorial Lecture, Johns Hopkins University, Baltimore, MD, October 24, 2012
- 9) Honoris Causa, Charles University, Prague, Czech Republic, April 4, 2012
- 10) Special Workshop in Honor of Professor K. R. Rajagopal, Challenges in analysis and modeling, Charles University, Prague, Czech Republic, March 31-April 4, 2012
- 11) Special Issue of Mathematical Models and Methods of Applied Sciences, On the occasion of K. R. Rajagopal's 60th Birthday (Guest eds. N. Bellomo and J. Malek), Volume 21, 1 (2011)
- 12) Special Issue of Applications of Mathematics, Dedicated to K. R. Rajagopal's 60th birthday (Guest eds. Pavel Krejci, J. Malek and V. Prusa), Volume 56, 1 (2011)
- 13) Special Issue of International Journal of Advances in Engineering Science and Applied Mathematics, Dedicated K. R. Rajagopal's 60th birthday (Guest eds. J. Muralikrishnan and U. Saravanan), 3, 4 issues, (2011)

- 14) Special Issue of The International Journal of Structural Changes in Solids, On the Occasion of K. R. Rajagopal's 60th birthday (eds. A. R. Srinivasa and S. M. Sivakumar), 3, 3 (2011)
- 15) Fellow, The Indian National Academy of Engineering (December 2010)
- 16) ISI Highly Cited Researcher
- 17) Special Issue of the International Journal of Engineering Science (750 pages), On the occasion of K. R. Rajagopal's 60th birthday (Guest eds: G. Saccomandi and M. Destrade), Volume 48, 11 (2010)
- 18) Recent Advances in Mechanics, 3-day conference held on the occasion of the K. R. Rajagopal's 60th birthday, Indian Institute of Technology, Madras, Chennai, November 25th-27th, 2010
- 19) Perambulations in Mechanics, 3-day conference held on the occasion of K. R. Rajagopal's 60th birthday, Texas A&M University, College Station, TX (2010)
- 20) Two special sessions held at the 47th Annual Meeting of the Society of Engineering Science, on the occasion of K. R. Rajagopal's 60th birthday, Iowa State University, Ames, IA (2010)
- 21) B. R. Seth Lecture: Inaugural Lecturer, Indian Institute of Technology-Kharagpur, West Bengal, India (2010)
- 22) Honoris Causa (DSc), Univeristy of Pretoria, Pretoria, South Africa (2010)
- 23) Springer Professorship, University of California, Berkeley, CA (2009)
- 24) Member, Board of Advisors, Department of Mechanical Engineering, San Diego State University, San Diego, CA (2009-to date)
- 25) Mathematics Distinguished Lecture, University of Central Florida, Orlando, FL (2009)
- 26) Guest of Honor, Release of 'Golden Jubilee Book Series' and the Inaugural Issue of IIT-M's International Journal of 'Advances in Engineering Sciences and Applied Mathematics', Chennai, India (2009)
- 27) Honorary Professor, Charles University, Prague, Czech Republic (2008-to date)
- 28) Adjunct Professor, Department of Bioengineering, University of Pittsburgh, Pittsburgh, PA (2008-to date)
- 29) Regents Professor, Texas A&M University, College Station, TX (2008-to date)
- 30) Distinguished Lecture, Hong Kong Society of Theoretical and Applied Mechanics, Sep 28, 2007, Hong Kong
- 31) Zable Medal, International Technological Institute (2007)
- 32) Hall of Fame of Science and Technology, International Technological Institute (2007)
- 33) Special Guest of Honor, International Workshop on Complex System in Fluid Flows and Sedimentation Processes held at the Indian Statistical Institute, Kolkata, India, August 27-31 (2007)
- 34) Honorary Professor, University of Witwatersrand, Johannesburg, South Africa (2007-to date)
- 35) Extraordinary Professor, University of Pretoria, Pretoria, South Africa, (2007-to date)
- 36) University of Auckland Foundation-Distinguished Visitor Award, Auckland, New Zealand, 2006-2007
- 37) University Grants Commission Center for Excellence in Fluid Mechanics, India, Award for Excellence in Fluid Mechanics Research, 2006
- 38) Memorial Medal, Faculty of Mathematics and Physics, Charles University, Prague, 2006
- 39) Steering Committee, Jindrich Necas Center for Mathematical Modeling, Charles University, Prague (2006-to date)
- 40) Sigma Xi Lecturer, US Naval Research Laboratory, Washington, D.C., 2006
- 41) Distinguished Professor (Honorary), Indian Institute of Technology, Madras, Chennai, India (2005-to date)
- 42) Archie Higdon Award, American Society of Engineering Education, 2005
- 43) Eringen Medal, Society of Engineering Science, 2004
- 44) Bush Excellence Award for Faculty in International Research, Bush Foundation, 2004
- 45) Midwest Mechanics Speaker, 2004
- 46) Cullimore Lecture, New Jersey Institute of Technology, 2004
- 47) Invited One-Hour lecture, Stokes' Death Centenary Meeting, Royal Irish Academy, Dublin, Ireland, 2003
- 48) Distinguished Professor, Texas A&M University, (2003-to date)
- 49) Distinguished Research Award, Association of Former Students, Texas A&M University, College Station, TX, 2002
- 50) Distinguished Teaching Award, Association of Former Students, Texas A&M University, College Station, TX, 2000

- 51) Outstanding Graduate Teaching Award, Department of Mechanical Engineering, Texas A&M University, College Station, TX, 2000
- 52) Sigma Xi Lecture, General Motors Research Center, Warren, MI, 2000
- 53) Distinguished Alumni Award, Indian Institute of Technology, Madras, India, 1998
- 54) Forsyth Chair, Department of Mechanical Engineering, Texas A&M University, College Station, TX (1996-to date)
- 55) Fellow, American Society of Mechanical Engineers (ASME), 1991
- 56) Orr Lectures, University College, Dublin, Ireland, 1991
- 57) President's Distinguished Research Award (Senior Category), University of Pittsburgh, Pittsburgh, PA, 1991
- 58) Chaired Professorship: James T. MacLeod Professor of Engineering, School of Engineering, University of Pittsburgh, Pittsburgh, PA, 1991
- 59) President, Society for Natural Philosophy, 1989-1991
- 60) Board of Visitors' Faculty Award, School of Engineering, University of Pittsburgh, Pittsburgh, PA, 1987
- 61) Board of Directors, Society for Natural Philosophy
- 62) International Directory of Distinguished Leadership: American Men and Women of Science
- 63) Who's Who Among Asian Americans

Editorship and Editorial Board Memberships:

Co-editor in Chief: International Journal of Engineering Science (Impact factor: 7.03, #1 Journal in Engineering Multidisciplinary Category-Clarivate Analytics-Web of Science).

Currently **member of over thirty five editorial boards** of archival journals and book series.

Served on over fifteen other additional editorial boards of journals in the past.

Membership in professional and honor societies:

President, Society for Natural Philosophy (1989-1991); Selection Committee, The Society for Natural Philosophy; Program Committee, The Society for Natural Philosophy; Joint AMD-MD Committee on Constitutive Equations, ASME; American Society of Mechanical Engineers (ASME) International American Academy of Mechanics (AAM); Society of Engineering Science (SES); American Society for Engineering Education (ASEE); Society of Rheology; The Society for Natural Philosophy

Publications:

Citations according to Google Scholar as of 8/7/2018: 23,168

Books

- 1) Mechanics and Mathematics of Fluids of the Differential Type (with D.Cioranescu and V. Girault), Series: Advances in Mechanics and Mathematics, Vol. 35, Springer International Publishing, Switzerland (2016).
- 2) Modeling of Biological Materials, (eds. F. Mollica, L. Preziosi and K.R. Rajagopal), Birkhauser, (2007).
- 3) Reviews in geomechanics, Vol. 3, Jindrich Necas Center For Mathematical Modeling: Lecture Notes, Charles University, Prague, (2007).
- 4) Mechanical Response of Polymers, An Introduction (with A.S. Wineman): Cambridge University Press, (2001).
- 5) An Introduction to the Mechanics of Fluids (with Clifford Truesdell). Birkhauser, Basel, (2000).
- 6) Mechanics of Mixtures (with L. Tao). Advances in Mathematics for the Applied Sciences, World Scientific Publishing: Singapore-New Jersey-London-Hong Kong, 1995
- 7) Recent Advances in Mechanics of Structured Continua. Volume I (eds. M. Massoudi and K.R. Rajagopal) AMD: Volume 117, American Society of Mechanical Engineers, New York, (1991).
- 8) Recent Advances in Mechanics of Structured Continua: Volume II (eds. M. Massoudi and K.R. Rajagopal) AMD: Volume 160, MD: Volume 41: American Society of Mechanical Engineers, New York, (1993).
- 9) Recent Advances in Elasticity, Viscoelasticity, and Inelasticity (ed. K.R. Rajagopal). World Scientific Publishing: Singapore-New Jersey-London-Hong Kong (1994).

Papers published in archival journals: Over five hundred and thirty papers (500).

Delivered over 250 Seminars, Plenary, Keynote and Invited lectures.

Supervised forty nine (49) Ph. D students. Seventeen (17) of them have faculty appointments.