

Lothar Gaul

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Current position

Full Professor of Mechanics, Universität Stuttgart ,1993-Present

Education

Dr.-Ing. habil. University of Hanover (Mechanical Engineering) 1980
Dr.-Ing. University of Hanover (Mechanical Engineering) 1976
M Eng. University of Hanover (Mechanical Engineering) 1973
Degree in Mech. Eng. (FHS Wilhelmshaven) 1969
Degree in Welding Eng. (SLV Berlin) 1969

Research interests

Numerical Simulation and Computer-Aided Testing (CAT) of Mechanical and Adaptive Structures. Development of Boundary Element and Finite Element Formulations for Fluid-Structure Interaction, Soil-Structure Interaction, Machine Dynamics, Contact Dynamics of Structural Joints and Brakes, Piezoelectrics; implementation of Generalized Damping Description and Uncertain Parameters by Fuzzy Arithmetic; CAT with novel measurement technologies, including 3-D Electronic Speckle Pattern Interferometry (CW-ESPI, Pulse-ESPI), Non-contact Measurement for Modal Testing, Wave Propagation Techniques for Structural Health Monitoring. Adaptive Structures; Damping Control by Active Joints, Active Vibration Isolation, Active Structural Acoustic Control.

Career

Dean, Process Engineering and Engineering Cybernetics, Universität Stuttgart, 1999-2002
Director, Institute A of Mechanics, Universität Stuttgart, 1993-Present.
Full Professor of Mechanics, Universität Stuttgart ,1993-Present.
Elected Member of the Academic Senate of the Universität Stuttgart, 2002-present
Dean of Mech. Eng. Univ. Federal Armed Forces Hamburg, 1991–1993
Full Professor and Head Institute of Mechanics, Univ. Federal Armed Forces Hamburg, 1981–1993 (Helmut-Schmidt-University)
Visiting Professor, Dept. of Ocean Eng., Florida Atlantic University, Boca Raton, USA, 1996-Present;
Distinguished Schmidt Visiting Professor, FAU Center of Applied Stochastics Research, 2001, 2005
Visiting Professor, Dept. Civil Eng. & Appl. Mech., McGill University, Montreal, Canada, 2000
Visiting Professor, Dept. Civil Eng., PUC, Rio de Janeiro, Brazil, 1999
Visiting Professor, Dept. Mech. Eng., Georgia Institute of Technology, Atlanta, USA, 1992
Visiting Professor, Dept. of Civil Eng., Columbia University, USA, 1990, 2002

Honors and awards

Recipient Hon. Ring German Eng. Society for Outstanding Achievements in Engineering 1985.
Reviewer German Research Society (DFG) 1996-Present.
Offer Chair A of Mechanics and Director Material Testing Lab. Techn. Univ. Munich 1996
Offer 1st Chair of Mechanics, Ruhr-Universität Bochum 1985.

Professional activities

Director of CAE + CAT Consulting, Ludwigsburg, Germany.
Consultant to: Daimler-Chrysler, Stuttgart, 1993-Present; Bosch, Stuttgart, 1996-Present; Fraunhofer Society, Stuttgart, (1992-Present); Consultant to Voith, Heidenheim, 1999; MAN-GHH Borsig, 2000-Present
Member German Eng. Society (VDI) Board Vibration Engineering, 1990-Present.
Member VDI, DVS, IABM, ISBE, SEM,
Professional Member American Academy of Mechanics (AAM) since 2002
Vice Secretary, GAMM (German Applied Mathematics and Mechanics Society),1995-2001.
Regional Editor, *Mechanics Research Communications* (2000-Present)
Member, Editorial Board, *Mechanical Systems and Signal Processing*(1996-Present)

Member, Editorial Board, *Engineering Analysis with Boundary Elements* (1998-Present)
 Associate Editor, *Computer Modeling in Engineering & Sciences, CMES* (since 2003)
 Sole Patentee, "Seal with Polygon Profile": German Patent Number: 4130767 C2 (1991)
 Sole Patentee, "Smart Joint": German Patent Number: 19702518 C2 (1997)

Refereed papers and chapters in books

Books: Methode der Randelemente in Statik und Dynamik, L. Gaul and C. Fiedler, Vieweg Publ.(1997)

Contact Mechanics, L. Gaul and C.A. Brebbia (Eds.), Computational Mechanics Publ. (1999).

Boundary Element Methods for Engineers and Scientists, An Introductory Course with Advanced Topics,

L. Gaul, M. Kögl, M. Wagner; Springer Publ. 2003

Chapters in Books: Contributor to 6 Books.

Refereed Journal Publications: Author or Co-Author of 151 papers in Refereed Journals covering continuum mechanics, waves, vibrations, discretization methods and history of mechanics.

Refereed Conference Publications: Author or Co-author of more than 200 publications

Summary of journal publications

Journal	Impact factor	Number of papers
Zeitschrift für Angewandte Mathematik und Mechanik	0,238	21
Engineering Analysis with Boundary Elements	0,951	11
Archive of Applied Mechanis	0,906	9
MSSP	0,809	9
Computational Mechanics Publications	0,946	5
CMES	1,957	1
Other indexed journals		72
Other papers in refereed journals		50

Selected publications (max. 5)

M. FISCHER, U. GAUGER, L. GAUL: *A multipole Galerkin boundary element method for acoustics*. Engineering Analysis with Boundary Elements, Vol. 28, 2004, pp. 155 – 162

S. HURLEBAUS, L. GAUL: *Smart Layer for Damage Diagnostics*. Journal of Intelligent Material Systems and Structures, Vol 15, Sep./Okt. 2004. Sage Publications, pp. 729 – 736

L. GAUL, R. NITSCHKE: *The role of friction in mechanical joints*. Applied Mechanics Reviews, Vol. 54, No. 2, March 2001 (ASME), pp. 93 – 106

L. GAUL, H. ALBRECHT, J. WIRNITZER: *Semi-active friction damping of large space truss structures*. Shock and Vibration, Vol. 11, No. 3/4 2004 (Special issue dedicated to Professor Bruno Piombo) IOS Press, Amsterdam, pp. 173 – 186

L. GAUL: *The Influence of Damping on Waves and Vibrations*. Mechanical Systems and Signal Processing, MSSP, (1999) 13 (1), 1 – 30

Other relevant information

Supervisor 33 Doctoral Students; Co-Supervisor 18 Doctoral Students

8 Post-Doctoral Associates for Habilitation Theses.

- Generalisation of Reissner's halfspace theory for 3-D viscoelastic soil interacting with rigid and flexible vibrating foundations of arbitrary shape.
- The implementation of generalized viscoelastic constitutive equations in frequency and time domain in boundary element formulations is associated with his several original works. Fundamental research results on damping description involving fractional operators and modal concepts were adopted in BEM and FEM implementations.
- Generalisations of static hybrid Boundary Element Formulations based on multifield variational problems to elastodynamics and acoustics. These formulations were cast into powerful fluid-structure interaction software.
- Contributions to dynamic contact formulations emerged from the idea to derive macroscale contact laws from microscale interface physics based on statistics of surface roughness measurements. FE implementations lead to various applications including rolling contact and metal forming with superimposed ultrasound.
- Contributions to Structural Health Monitoring range from source identification methods to the development of smart layers which actuate and sense wave fields and process the signals for conditions identification.
- Merged structural dynamics, actuator and sensor implementation and control design (Lyapunov-, Neural Network-, Modal-control) in adaptive structure acoustic control (ASAC) or active vibration and damping control.
- Initiated and hosted the stay of three Alexander von Humboldt Research Award Winners from the USA, Japan and Canada. Proposed the Max-Planck-Research Award for International Cooperation 2003. Bilateral programs such as PROBRAL and ISAP provide a frame for ongoing scientific exchange between PUC Rio de Janeiro and Georgia Tech respectively with the Institute A of Mechanics at University of Stuttgart.