

# Preface

In January 2012 the International Conference *Recent Trends in Dynamical Systems* was held in Munich on the occasion of Jürgen Scheurle's 60th birthday. As parts of this conference, a scientific colloquium took place at the Carl Friedrich von Siemens Stiftung in Munich from 11th to 13th of January and also a Festkolloquium at the Technische Universität München in the afternoon of January 13th. Besides numerous posters on recent advances in the field of dynamical systems, 25 highly recognized scholars gave plenary talks that were grouped according to the following themes:

- Stability and bifurcation
- Geometric mechanics and control theory
- Invariant manifolds, attractors, and chaos
- Fluid mechanics and elasticity
- Perturbations and multiscale problems
- Hamiltonian dynamics and KAM theory

These themes reflect the broad scientific interests of Jürgen Scheurle and his fascination of applying mathematics to real world situations, in particular from physics and mechanics. The volume at hand is an outgrowth of this conference, containing research articles about exciting new developments in the multifaceted subject of dynamical systems as well as survey articles. We are very happy that the authors accepted the invitation to contribute to this volume in honour of Jürgen Scheurle and we are sure that their exciting articles will be of interest not only to experts in the field of dynamical systems but also to graduate students and scientists from many other fields, including engineering. This is in the spirit of Jürgen Scheurle, who, besides his research activities, always puts a lot of emphasis on conveying the beauty of the Theory of Dynamical Systems and its applicability to real world problems in extremely well-prepared, beautiful lectures.

Munich, Germany  
January 2013

Andreas Johann  
Hans-Peter Kruse  
Florian Rupp  
Stephan Schmitz

## *Short Curriculum Vitae of Jürgen Scheurle*

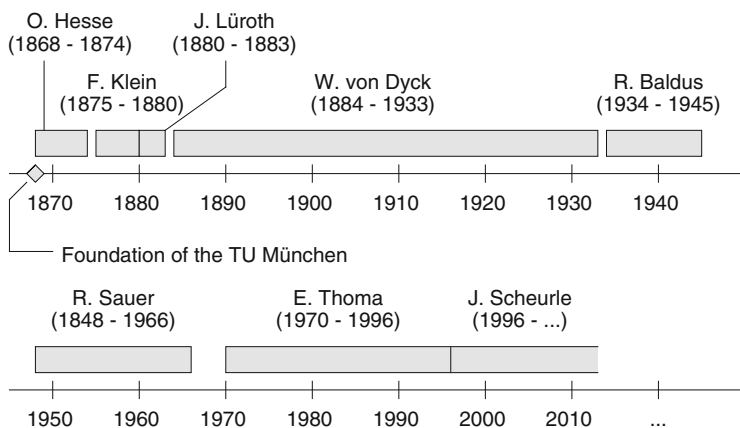
Jürgen Scheurle was born on September 26, 1951, in Schwäbisch Gmünd, Baden-Württemberg. He received his professional education at the University of Stuttgart, where he studied mathematics, physics, and computer science from 1970 until 1974, and finished his diploma degree in mathematics with a thesis entitled “Ein Antikonvergenzprinzip”. Some months later, in 1975, he completed his doctorate under the guidance of Klaus Kirchgässner. The title of his Ph.D. thesis is “Ein selektives Iterationsverfahren und Verzweigungsprobleme”. In 1981 he presented his Habilitation thesis on “Verzweigung quasiperiodischer Lösungen bei reversiblen dynamischen Systemen”.

From 1974 to 1985 Jürgen Scheurle held positions as a postdoctoral researcher, senior researcher, and assistant professor, at the University of Stuttgart. In 1982 he was visiting professor at the Department of Mathematics, University of California, Berkeley (USA), and in 1983 at the Division of Applied Mathematics, Brown University, Providence (USA). In 1985 Jürgen Scheurle moved to Fort Collins (USA), where he became an associate and later full professor at Colorado State University. In 1987 he accepted a full professorship and the Chair of Theory and Applications of Partial Differential Equations at the University of Hamburg. In 1996 Jürgen Scheurle was appointed full professor at the Technische Universität München (TUM) and since then holds the Chair of Advanced Mathematics and Analytical Mechanics. Notable predecessors at this chair were Felix Klein, Walter von Dyck, and Robert Sauer, see Fig. 1, which illustrates the special responsibility of Jürgen Scheurle for the mathematical education of engineering students.

He was the founding director of the Center for Mathematics at TUM and later dean of the Faculty of Mathematics. As dean, he continued the reform-oriented politics of his predecessors. During his term in office, the faculty voluntarily conducted a peer assessment and was awarded the title “Reformfakultät” by the “Stifterverband der Deutschen Wissenschaft”. Such assessments are common nowadays but were completely novel 10 years ago. Moreover, far ahead before such procedures were put into law, the Bavarian Ministry of Research and Teaching allowed the faculty to introduce an “Experimentierklausel” to assess prospective for the admission of students.

Jürgen Scheurle was responsible for the introduction of the “Master of Science in Industrial & Financial Mathematics” at the off-shore campus of TUM in Singapore. He was a member of the planning team for the new mathematics building at the research campus Garching and in charge of the relocation from downtown Munich to Garching in 2002. Finally, Jürgen Scheurle was and is member of numerous expert committees appointed by the president of the TUM and the faculty of mathematics. Inter alia he is representative of the “Bayerische Eliteakademie”, member of the “Hurwitz-Gesellschaft zur Förderung der Mathematik an der TU München” and its president since 2011.

Jürgen Scheurle authored and co-authored several pioneering publications, and among them the following are highly influential articles:



**Fig. 1** Genealogy of the chair “Analytische Mechanik und Angewandte Mathematik” at the Technische Universität München

- *On the bounded solutions of a semilinear elliptic equation in a strip* (together with K. Kirchgässner). J. Diff. Equat. 32 (1) (1979), 119–148.
- *Smoothness of bounded solutions of non-linear evolution equations* (together with J. Hale). J. Diff. Equat. 56 (1) (1985), 142–163.
- *Chaotic solutions of systems with almost periodic forcing*. ZAMP 37 (1986), 12–26.
- *The construction and smoothness of invariant manifolds by the deformation method* (together with J. Marsden). SIAM J. Math. Anal. 18 (5) (1987), 1261–1274.
- *Exponentially small splittings of separatrices in KAM theory and degenerate bifurcations* (together with P. Holmes and J. Marsden). Cont. Math. 81 (1988), 213–243.
- *Existence of perturbed solitary wave solutions to a model equation for water waves* (together with J. Hunter). Physica D 32 (1988), 253–268.
- *Lagrangian reduction and bifurcations of relative equilibria of the double spherical pendulum* (together with J. Marsden). ZAMP 44 (1993), 17 - 43.
- *The reduced Euler-Lagrange equations* (together with J. Marsden). Fields Inst. Comm. 1 (1993), 139–164.
- *Pattern evocation and geometric phases in mechanical systems with symmetry* (together with J. Marsden), Dyn. and Stab. of Systems 10 (1995), 315–338.
- *Discretization of homoclinic orbits and “invisible” chaos* (together with B. Fiedler). Memoirs of the AMS vol. 119, nb. 570 (3), Providence 1996.
- *Reduction Theory and the Lagrange-Routh equations* (together with J. Marsden and T. Ratiu). J. Math. Phys. 41(6) (2000), 3379–3429.
- *The orbit space method* (together with M. Rumberger). In Ergodic Theory, Analysis and Efficient Simulation of Dynamical Systems, B. Fiedler ed., Springer-Verlag 2001, 649–689.

- *On the generation of conjugate flanks for arbitrary gear geometries* (together with A. Johann). GAMM-Mitt. 32, No. 1, 2009, 61–79.

His teaching covers a wide spectrum of subjects, ranging from mathematics for engineering students, functional analysis, ordinary differential equations and partial differential equations to dynamical systems, bifurcation theory, hamiltonian dynamics, geometric mechanics, mathematical methods in continuum mechanics, and mathematical modeling in biology and ecology. He supervised more than 20 dissertations and habilitations in these areas.

Jürgen Scheurle was a member of the advisory board of the book series *Dynamics Reported* and an executive editor of the *International Journal of Nonlinear Mechanics*. He is currently a member of the editorial board of the *Journal of Nonlinear Science*, *Nonlinear Science Today*, *Journal of Applied Mathematics and Mechanics* (ZAMM), and *Journal of Geometric Mechanics*.



Conference photo in the garden of the Carl Friedrich von Siemens Stiftung at the Schloß Nymphenburg, Munich

## ***Registered Participants in Alphabetic Order***

- Wolf-Jürgen Beyn
- Anthony Bloch
- Jörg-Stefan Bock
- Henk W. Broer
- Tomas Caraballo
- David Chillingworth
- Florin Diacu
- Michael Dellnitz
- Jochen Denzler
- Freddy Dumortier
- Dominik Eberlein
- Francesco Fasso
- Peter Giesl
- Christoph Glocker
- John Guckenheimer
- Thomas Hagen
- Heinz Hanßmann
- Karl-Heinz Hoffmann
- Phillip Huber
- Delia Ionescu-Kruse
- Gerard Iooss
- Andreas Johann
- Christopher K.R.T. Jones
- Oliver Junge
- Hansjörg Kielhumlautfer
- Peter E. Kloeden
- Thorsten Knott
- Peter Koltai
- Carl Friedrich Kreiner
- P.S. Krishnaprasad
- Hans-Peter Kruse
- Tassilo Küpper
- Christian Kühn
- Rainer Lauterbach
- Martin Lehl
- Armin Leutbecher
- Daniel Matthes
- Johannes Mayet
- Alexander Mielke
- James Montaldi
- Horst Osberger
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- Tudor Ratiu
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- Matthias Rumberger
- Florian Rupp
- Johannes Rutzmoser
- Björn Sandstede
- Jürgen Scheurle
- Thorsten Schindler
- Günter Schlichting
- Guido Schneider
- Stephan Schmitz
- Svenja Schoeder
- Andreas Schuppert
- Rüdier Seydl
- Andre Vanderbauwhede
- Sebastian Walcher
- Bodo Werner
- Johannes Zimmer

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