

## In Memoriam Klaus Kirchgässner

Klaus Kirchgässner was born in Mannheim on December 26, 1931, and died in Konstanz on July 9, 2011. He grew up in the small, lovely town of Waldshut, which is located along the Rhine at the extreme south of the Black Forest. With his friends he spoke with enthusiasm about this city, where he did swimming in the Rhine and in the Aare river and where he completed his high-school education (“Gymnasium”).

Klaus Kirchgässner studied Mathematics and Physics at the “Albert-Ludwigs-Universität” of Freiburg, one of the oldest universities in Germany. His pioneering work in hydrodynamic stability began with his doctorate “Beiträge zur hydrodynamischen Stabilitätstheorie”, defended in 1959, under the supervision of Professor Henry Görtler, who was one of the most famous experts in fluid mechanics at this time in Germany and who had been a close collaborator of Ludwig Prandtl for several years. So it was quite a privilege, for Klaus Kirchgässner to give the Ludwig-Prandtl Memorial Lecture entitled “Structure and Dynamics of Nonlinear Surface Waves” at the GAMM Annual Meeting in Leipzig in 1992.

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Klaus Kirchgässner's studies in the years 1960–1965 were devoted to stability and instability problems concerning specific models in fluid mechanics, combining rigorous analysis and numerical methods. This naturally led him to bifurcation problems. His remarkable Habilitationsschrift “Verzweigungslösungen eines stationären, hydrodynamischen Randwertproblems” from 1966 can be seen as a milestone of modern bifurcation theory.

Klaus Kirchgässner was among the first researchers to give rigorous proofs of the existence of bifurcating solutions in famous models in hydrodynamics, such as the Taylor and Bénard problems. As a matter of fact, his contributions to these problems can be viewed as the starting point for systematic mathematical investigations of bifurcation problems with symmetry and of symmetry breaking bifurcations. Those contributions were rapidly recognized. Already in the 1976 book “Hopf Bifurcation and its Applications” by Marsden and McCracken, a whole chapter was devoted to this work of Klaus Kirchgässner and in particular to his results with Hans-Jörg Kiehlhöfer [20].

The study of the Bénard and Taylor problems naturally led him to the investigation of all small bounded solutions to nonlinear elliptic problems in two-dimensional infinite strips. Together with Jürgen Scheurle [31, 34, 35], he introduced a brand new method of solving these problems by considering the unbounded direction as the “time variable”. This novel point of view allowed him to use dynamical systems tools and in particular a center manifold approach in order to study the “small” solutions of such elliptic problems, see [37]. This *spatial center-manifold reduction* rapidly became an indispensable and classical tool. Nowadays, it is widely used to study pattern formation and various sorts of wave phenomena in spatially extended systems.

Klaus Kirchgässner had a successful academic career. Before becoming full professor at the University of Bochum in 1969, he held visiting positions at important universities in his field, including MIT and the Mathematics Research Center at the University of Wisconsin in Madison. In 1972, he was offered a Chair in Analysis and Applied Mathematics at the Mathematical Institute A of the University of Stuttgart. He held this Chair till 1998, when he became Professor Emeritus.

Klaus Kirchgässner was a dedicated teacher and advisor. He attracted generations of students by his openness, his unique manner of teaching mathematics in an interdisciplinary spirit and his deep understanding of mathematical problems coming from physical or engineering sciences. Besides his Ph.D. students, he also guided, encouraged and tremendously influenced many younger scientists with his clear mathematical vision and his high professional and moral standards.

During his time at Stuttgart, he also shaped the interdisciplinary research at the university there. He initiated new curricula for the advanced mathematics courses for students of engineering and physics, which laid the foundations for the interdisciplinary activities in Stuttgart, such as the Graduiertenkolleg *Discretization methods for problems in continuum mechanics* and the Collaborative Research Center SFB 404 *Multifield Problems in Solid and Fluid Mechanics*.

The weekly seminar, that Klaus Kirchgässner had been running for years at the university, created a really unique scientific environment for his students and younger colleagues. As a natural outcome of his activities, the Mathematical Institute A became an important research center hosting leading international experts in analysis and applied mathematics.

Klaus Kirchgässner received several important honors: the Erich Trefftz Prize for his work on hydrodynamic instability in 1967, the Agostinelli Award of the Accademia Nazionale dei Lincei in 1989, the Max Planck Research Award in 1993, the election as a corresponding member of the Accademia Nazionale di Scienze, Lettere e Arti di Modena in 1983, of the Accademia delle Scienze dell'Istituto di Bologna in 1984, and of the Akademie der

Wissenschaften und der Literatur Mainz in 1993 and the election as a member of the Heidelberger Akademie der Wissenschaften in 1996. This illustrates the high impact he had on the mathematical life in Germany and abroad. The recognition of his mathematical achievements is also reflected in the fact that he was a member of editorial boards of several first class mathematical journals, including the Archive for Rational Mechanics and Analysis, the Journal of Dynamics and Differential Equations, Mathematical Methods in Applied Sciences, the Proceedings of the Royal Society of Edinburgh. In addition, he was a member of the Programme Committee of the International Center for Mathematical Sciences (ICMS) in Edinburgh.

Klaus Kirchgässner rendered invaluable services to the German mathematical community. As a member of the Senat der Deutschen Forschungsgemeinschaft, he heavily supported basic research in Mathematics as well as its applications in other fields and in industry. He was actively involved in the Gesellschaft für Angewandte Mathematik und Mechanik, for which he served as president from 1980 to 1983. He had a clear vision on how to enhance interactions between mathematics, physics and mechanics. He was strongly dedicated to the development of the *Mathematisches Forschungsinstitut Oberwolfach*. He served as a member of the Advisory Board from 1987 to 1996 and as chairman of the *Gesellschaft für Mathematische Forschung* from 1997 to 2001.

Needless to say, Klaus Kirchgässner was a hard worker. But, after hard work, there was also time for recreation with his students, colleagues or numerous visitors. He often invited them to “alpine hikes” or to “cultural outings and tours”. Anyone who had the privilege to join him on such tours will never forget it. This was an occasion to appreciate him as an enthusiastic mountain hiker, a very cultivated man with broad interests, in literature, history, music, and a man with a great sense of humor. Klaus Kirchgässner also kept open house for his colleagues and visitors. The picture of Klaus Kirchgässner would not be complete without mentioning his love for classical music. He was an excellent violinist as well as piano player.

Klaus Kirchgässner was an exceptionally generous person, generous with his time, with his ideas, and more generally in any occasion of everyday life. For many of us, Klaus Kirchgässner remains an inspiring example to follow and an ideal to reach.

With Klaus Kirchgässner, the community of researchers in applied mathematics and non-linear analysis lost one of its central figures. But his legacy lives on in his scientific achievements and in the many people he had mentored. Those who knew him will for ever remember his friendly, warm and caring nature and cherish many happy memories.

## 1 Edited books

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