



LAUDATIO FOR PROFESSOR WILLI JÄGER



Willi Jäger is a leading personality in the field of mathematical modelling, analysis, and simulation of complex and mainly nonlinear systems.

From 1974 to 2008 he was Full Professor of Institute for Applied Mathematics at the University of Heidelberg, in Germany. He became 1987 founding Director of the Center for Scientific Computing, a central Institution of the University. In 1983 he began his work as a member of the Scientific Advisory Board of the Oberwolfach

Mathematical Research Institute of and from 2002 to 2013 as Chairman of the Oberwolfach Society Mathematical Research Center. From 2004 to 2020 he led as Coordinator the Heidelberg Center for Modeling and Simulation in Biosciences (BIOMS).

In 1966 he completed his PhD in Mathematics at University of Munich under the direction of Erhard Heinz, known for his work on Monge-Ampère differential equation, and followed as his assistant to Göttingen, where he received his habilitation in mathematics in 1969.

At the invitation of Richard Courant he was visiting scientist at the Courant Institute in New York City from 1969 to 1970. In 1970 he became professor of mathematics at the University of Münster, a position he held until 1974, when he accepted the call to the University of Heidelberg.

From 1978 to 1982 he was Chairman of SFB 123 "Stochastic, Mathematical Models"; from 1993 to 2004 member of the Board of SFB 359 "Reactive Flow, Diffusion and Transport"; from 1999 to 2003 Vice President for the Section "Mathematics and Sciences" at the Heidelberg Academy of Sciences. Thus far, he has been honoured with 5 honorary doctorates, several prizes all across Europe and the Order of Merit of the Federal Republic of Germany. He gave a DMV Gauss Lecture in 2007.

Outstanding scientist in the field of nonlinear analysis and its applications, he uniquely combines the analytical power of a mathematician with a great power of intuition in empirical sciences. He obtained important results in the spectral theory of differential operators, in research of the regularity of minimal surfaces, the issues of uniqueness and bifurcations for solutions of quasilinear elliptic and parabolic systems, including for harmonic maps of Riemannian spaces. His contribution to the development of methods of mathematical modeling of complex chemical structures and processes, accompanied by reactions, filtration, diffusion, cannot be overemphasized. He was the first to construct mathematical models for many of these phenomena. In particular, using modern methods of asymptotic analysis and the theory of averaging, he obtained new macroscopic liquid-flow equations, taking into account the reactions and microstructure of the objects, found the conditions on the phase boundaries. A rigorous mathematical study of the nonlinear problems

obtained (stability, asymptotic behavior, regularity of solutions, occurrence of singularities) was conducted; analytical and numerical methods of their solution were proposed.

The Interdisciplinary Center of Scientific Computing (IWR), of which he was the founding director in 1987 and which he built up in close co-operation with partners from different disciplines, is one of the world leaders in the field of creating software packages for the issues of tomography, hydrodynamics, architecture and many nonlinear problems arising in the industry.

Prof. Jäger is the leader and active participant of a number of research projects, including projects on mathematical modeling of physicochemical processes in diffusion systems (1978-1992), projects in the field of "Computer and Sensory Surgery" (1998), on the topic "Numerical Solution of Tasks of Hydrodynamics on Supercomputers" and a number of other important projects.

Alongside his 'pure' activity of research and research management, equally important is his commitment to scientific dissemination and dialogue between different fields of mathematics and applied sciences.

His excellent research results are reflected in more than 95 disciplinary publications in reviewed journals and proceedings, 15 interdisciplinary publications, 18 edited books (among the others "Calculations and Visualization in Science" edited by Springer, "Analysis", by Oldenburg, "Journal of Pure and Applied Mathematics" by Gruyter, "Notes on Applied Mathematics", by Springer, "Journal of Mathematical Biology", by Springer).

He has contributed substantially to the development of new fields such as computational science and scientific computing by building (1987) the Interdisciplinary Centre for Scientific Computing (IWR). The foundation of BIOMS (Centre for Modelling and Simulation in Biosciences) (2004) and BIOQUANT (2006) are milestones in the research of stronger quantitatively oriented biosciences.

Recognising that industrial innovation is increasingly based on the results and techniques of scientific research, and this research is inextricably linked to mathematics, he promoted the role of mathematics as a key technology for the future. On this purpose, it's remarkable his activity as Chairman of the Committee of the BMBF (German Federal Ministry of Education and Research) Program Mathematics in Industry.

Unique combination of excellence as a scientist, as a promoter of science. and as an educator, Prof. Jäger has represented an absolute point of reference for more than a generation of young students. Throughout his entire career his ability to direct and train the specific skills of those scientists 'in fieri' has been absolutely prominent; he had more than 100 PhD students, some of these have become very prestigious scientists in their specific field.

For all exposed reasons the Committee, entrusted by the Scientific Committee of the International Research Center MeMoCS with the responsibility of awarding the International Eugenio Beltrami Prize unanimously proposes Professor Willi Jäger as recipient of the 2022 edition.