Jörg Waldvogel

1 Curriculum Vitae

Born:	February 24, 1938 in Zurich.
Studies:	
1957 - 1962:	Abteilung Mathematics and Physics, ETH Zurich.
1962:	Diploma in Mathematics.
1966:	PhD in Mathematics with a thesis in celestial mechanics, Advisor: Professor Eduard Stiefel.
Professional	*career:*
1967 - 1970:	Research Scientist, Lockheed Missiles and Space Company, Huntsville, Alabama.
1968 - 1969:	Part-time Assistant Professor in mathematics, University of Alabama at Huntsville.
1970 - 1972:	Assistant Professor, University of Texas at Austin.
1972 - 2003:	Wissenschaftlicher Adjunkt. Head of the Numerical Advisory Section at the Seminar for Applied Mathematics (SAM) of ETH.
1985:	Titularprofessor of ETH, Dept. of Mathematics. Teaching in mathematics and numerical analysis.
1992 - 2007:	Member of the School Board of the Kantonsschule *Im Lee*, Winterthur.
1992 - 2014:	Member of the *Aufnahmeprüfungskommission* ETH, *Prüfungsleiter* 2006.
2003 - 2004:	Lehrauftrag ETH *Numerical Analysis for Engineers* (2 summer semesters)
2003:	Retirement. Until present: Professor emeritus at ETH. Still involved in several research projects of SAM.

2 Research

The emphasis of the past and current research is in applications of ordinary differential equations to engineering and, in particular, on various topics of celestial mechanics. Counseling activities have often resulted in relevant research projects, e.g. the control of five-axial milling, or pricing of callable bonds in mathematics of finance. This latter project reflects the growing importance of partial differential equations in all of mathematics. Other fields of research: Numerical quadrature, numerical analysis in general, asymptotics, computational number theory. Future goals are the intensification of contacts with industry and other universities.

Recently Completed Projects

In several articles of the book *Solving Problems in Scientific Computing using Maple and Matlab,* edited by W. Gander and J. Hřebiček, we demonstrated the use of modern mathematical software for elegantly solving complicated problems of industrial mathematics.

This project exemplified interdepartmental (with Informatics) and international (with the Czech Republic) cooperation.
In the book *The SIAM 100-Digit Challenge* by F. Bornemann, D. Laurie, S. Wagon, and J. Waldvogel (SIAM, Philadelphia 2004, 306 pp.) the four authors discuss the entire field of numerical analysis in the context of solutions to the 10 famous problems posed by N. Trefethen in SIAM News 2002.

Research Funding

The SNSF project *Fast Primality Proving with cyclotomy*, 1998-2000, jointly granted to J. Waldvogel, M. Knus (Mathematics), and G. Gonnet (Informatics), with Dr. P. Mihailescu being the principal researcher, originated from common features between numerical mathematics and computational number theory.

3 Ph.D. Students and Postdoctoral Researchers

Kaspar Nipp (1976 - 1980), ETH Diss. 6643, Prof. P. Henrici
An algorithmic approach to singular perturbation problems in ordinary differential equations with an application to the Belousov-Zhabotinskii reaction

Alessandra Celletti (1986 - 1989), ETH Diss. 8926, Prof. J. Moser
Analysis of resonances in the spin-orbit problem in celestial mechanics

Lorenz Frey (1984 - 1990), ETH Diss. 9174, Prof. J. Marti
Theoretical and numerical aspects of a general extension scheme for quadrature formulas in one dimension

Fabian Winterberg (2001 - 2004), ETH Diss. 15461, co-referee Prof. E. Zehnder
Non-integrability of Hill's lunar problem

Co-referee for:
1979, Denis Eschbach, Université de Franche-Compté Besançon, Prof. L. Losco
1981, Hans Grassl, ETH Diss. 6776, Prof. P. Fornallaz
1982, Gabor Groh, ETH Diss. 7049, Prof. J. Marti
1985, Maylis Irigoyen, Université Paris IV, Prof. F. Nahon
1991, Stephan Bondeli, ETH Diss. 9493, Prof. W. Gander
1992, Magnus Pirovino, ETH Diss. 9683, Prof. J. Marti
1993, Urs von Matt, ETH Diss. 9979, Prof. W. Gander, G. Golub
1993, Maria Teresa Dib, Université de Genève, Prof. G. Wanner
1995, Ralph Gasser, ETH Diss. 10927, Prof. J. Nievergelt, Schaeffer
1996, Guang Yü, ETH Diss. 11430, Prof. M. Engeli
1998, Thomas Schnider, ETH Diss. 12522, Prof. M. Engeli
2000, Gül Ogan, ETH Diss. 13613, Prof. M. Engeli
2009, Pedro Gonnet, ETH Diss. 18347, Prof. W. Gander

4 Selected publications by J. Waldvogel

1. *Numerical quadrature in several dimensions,* in: H. Brass and G. Haemmerlin (eds.), Numerical Integration III, Birkhäuser 1988, 295-309.

2. *Integralberechnung,* in: H.R. Schwarz, Numerische Mathematik, Teubner 1986, 319-338. English edition: *Numerical Quadrature,* in: H.R. Schwarz, Numerical Analysis, John Wiley 1989, 330-350.

3. *Symplectic Integrators for Hill's Lunar Problem,* in: R. Dvorak and J. Henrard (eds.), Dynamical Behaviour of our Planetary System, Kluwer 1997, 291-305.

4. *Contour plots of analytic functions* (with W. Gautschi), in: W. Gander and J. Hrebicek (eds.), Solving Problems in Scientific Computing Using Maple and MATLAB, Springer 1997, 3rd ed., 359-372.

5. *Long-term evolution of coorbital motion,* in: B.A. Steves and A.E.Roy (eds.), The Dynamics of Small Bodies in the Solar System: A Major Key to Solar System Studies, NATO ASI Series C, Plenum 1999, 257-276.

6. *A functional equation related to the iteration of functions* (with R. Resch and F. Stenger), Aequationes Mathematicae **60** (2000), 25-37.

7. *Central configurations revisited,* in: B.A. Steves and A.J. Maciejewski (eds.): The Restless Universe: Applications of Gravitational N-Body Dynamics to Planetary, Stellar and Galactic Systems. The Scottish Physical Society, 2001, 285-299.

8. *Computing the Hilbert transform of the generalized Laguerre and Hermite weight functions* (with W. Gautschi), BIT **41** (2001), 490-503.

9. *Triple collision and close triple encounters,* in: D. Benest and C. Froeschlé (eds.): Singularities in Gravitational Systems. Applications to Chaotic Transport in the Solar System. Lecture Notes in Physics, Springer 2002, 81 - 100.

10. *The SIAM 100-Digit Challenge* (by Folkmar Bornemann, Dirk Laurie, Stan Wagon, and Jörg Waldvogel). SIAM, Philadelphia 2004, 306 pp.

11. *Quaternions for regularizing celestial mechanics – the right way.* Celest. Mech. Dyn. Astr. **102** (2008), 149-162.

12. *Towards a general error theory of the trapezoidal rule.* In: W. Gautschi, G. Mastroianni, Th.M. Rassias (eds.), Approximation and Computation. In honor of Gradimir V. Milovanović. Springer Optimization and its Applications **42**, 267–282, Springer, New York, 2011.

13. *The rhomboidal symmetric four-body problem.* Celest. Mech. Dyn. Astr. **113** (2012), 113 - 123.

14. *Jost Bürgi and the discovery of the logarithms.* Elem. Math. **69** (2014), 89 - 117.