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01 Sep 2010

# Roger Temam on the Occasion of His 70th Birthday

**Claude Michel Brauner** 

**Danielle Hilhorst** 

Alain Miranville

Shouhong Wang

et. al. For a complete list of authors, see https://scholarsmine.mst.edu/math\_stat\_facwork/1228

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## **Recommended Citation**

C. M. Brauner et al., "Roger Temam on the Occasion of His 70th Birthday," *Discrete and Continuous Dynamical Systems*, vol. 28, no. 1, American Institute of Mathematical Sciences (AIMS), Sep 2010. The definitive version is available at https://doi.org/10.3934/dcds.2010.28.1i

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## Roger Temam on the occasion of his 70th birthday

This is Part II of a two-part series of Discrete and Continuous Dynamical Systems dedicated to Roger Temam on the occasion of his 70th birthday.

Born in Tunis on May 19, 1940, Roger Temam moved to Paris in 1957 to study at the University of Paris, which was at that time the only university in Paris, known as La Sorbonne. He wrote his doctoral thesis under the supervision of Professor Jacques-Louis Lions and became a professor at the University of Paris-Sud XI at Orsay in 1968. There, he founded, together with Professors Jacques Deny and Charles Goulaouic, the Laboratory of Numerical and Functional Analysis which he directed from 1972 to 1988. He was also a Maître de Conférences at the famous Ecole Polytechnique from 1968 to 1986.

In 1983, Roger Temam co-founded the SMAI, the French Applied and Industrial Mathematical Society, analogous to SIAM, and served as its first president. He initiated the ICIAM conference series and was head of the Steering Committee of its first meeting held in Paris in 1987. He was also the Editor-in-Chief of the mathematical journal M2AN from 1986 to 1997, and he is or has been on the editorial board of such journals as Asymptotic Analysis, Discrete and Continuous Dynamical Systems, Journal of Differential Equations, Physica D, Communications in PDEs and SIAM Journal of Numerical Analysis.

Roger Temam also has a very successful career in the United States. He was appointed College Professor in 1986 at the Indiana University at Bloomington, initially on a part time basis. There, he co-directed, together with Ciprian Foias, the Institute for Scientific Computing and Applied Mathematics. He became the Director of this Institute in 1992, which he has remained up to now.

Roger Temam has won several prestigious prizes during his scientific career.

He obtained his first prize, namely the Peccot Prize from the Collège de France, in 1970 for his thesis work on the fractional steps method. He was then awarded the Carrière Prize from the French Academy of Sciences in 1977, the Seymour Cray Prize for numerical simulations in 1989 for his work on the nonlinear Galerkin method and other multilevel methods, the Alexandre Joannides Prize from the French Academy of Sciences in 1993 and the Jacques-Louis Lions Prize from the French Academy of Sciences in 2003 (he was the first laureate of this prize).

In December 2007, Roger Temam was elected member of the French Academy of Sciences.

Roger Temam was named Fellow of SIAM (in the first promotion) in 2009. He is also an Honorary Professor at Fudan University.

The scientific work of Roger Temam, which is at the interface between mathematical analysis, numerical analysis and scientific computing, includes mathematical modeling and analysis, as well as the development of novel numerical methods. He has published over 300 research papers in top mathematical journals and 12 books, several of which are now bestsellers and classical in the corresponding research fields.

#### PREFACE

As already mentioned the first work of Roger Temam dealt with the fractional steps method and its application to the incompressible Navier-Stokes equations, which was independently studied by Alexandre J. Chorin.

Then he constantly explored and developed new directions and techniques:

- Calculus of variations, and, more precisely, the notion of duality, developing the mathematical framework for discontinuous (in displacement) solutions;

- Mathematical formulation of the equilibrium of a plasma in a cavity, expressed as a free boundary problem;

- Korteweg-de Vries equation;

- Kuramoto-Sivashinsky equation;

- Euler equations;

- Infinite-dimensional dynamical systems theory. In particular, he studied the existence of the finite-dimensional global attractor for many dissipative equations of mathematical physics, including the incompressible Navier-Stokes equations, for which he obtained, with Peter Constantin, Ciprian Foias and Oscar Manley, a physically relevant almost sharp upper bound on the dimension of the global attractor. He was also the co-founder of the concepts of inertial manifolds together with Ciprian Foias and George R. Sell and of exponential attractors together with Alp Eden, Ciprian Foias and Basil Nicolaenko;

- Optimal control of the incompressible Navier-Stokes equations;

- Boundary layer phenomena for incompressible flows.

The main activities of Roger Temam nowadays concern the study of geophysical flows, the atmosphere and oceans. This started in the 1990s by a collaboration with Jacques-Louis Lions and Shouhong Wang.

The influence of Roger Temam in the development of applied mathematics in France, as well as all over the world, has been essential. His scientific aura and influence can also be measured in the number of doctoral theses which were written under his guidance, both in France and in the United States. According to the Mathematical Genealogy Project database, he holds the first position in the top 50 advisors. More than 30 of his students are now full professors, all over the world, and have themselves many descendants.

His wife, Claudette, and his family have always been at his side and, on the occasion of Roger's 70th birthday, we send to all of them our best wishes for the coming years. We also wish to Roger many more students and new results to come.

### **Guest Editors:**

Claude-Michel Brauner Danielle Hilhorst Alain Miranville Shouhong Wang and Xiaoming Wang PREFACE



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