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TA-TSIEN LI
Editor-in-Chief

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*The Special Issue of Chinese Annals of Mathematics Series B*
*Dedicated to Professor Luc Tartar*

The Guest Editors
Radjesvarane ALEXANDRE Alain DAMLAMIAN François MURAT

Professor Luc Tartar

# Preface

Radjesvarane ALEXANDRE Alain DAMLAMIAN
Tatsien LI François MURAT

The *International Conference on Nonlinear and Multiscale Partial Differential Equations: Theory, Numerics and Applications* was held on September 16–20, 2013 at Fudan University, Shanghai. It was organized in honor of Luc Tartar by the *Institut Sino-Français de Mathématiques Appliquées* (ISFMA, the Sino-French Institute of Applied Mathematics). Its aim was to present recent achievements in the theory and the numerics of the nonlinear partial differential equations, and especially of their multiscale aspects, topics to which Luc Tartar made outstanding contributions.

The conference gathered 19 plenary speakers from Chile, China, France, Spain, Switzerland, the United Kingdom and the United States of America, 14 of whom have accepted to give a written version of their contribution to constitute the present *Special Issue of Chinese Annals of Mathematics dedicated to Luc Tartar*. We are very grateful to them for their participation and contributions.

The conference was sponsored by the Ambassade de France in Beijing, the Chinese Mathematical Society, the Consulat Général de France in Shanghai, Fudan University, the Institut National des Sciences Mathématiques et de leurs Interactions (INSMI-CNRS), the Mathematical Center of the Ministry of Education of China, the Shanghai Center for Mathematical Sciences (SCMS), Shanghai Jiaotong University and the Shanghai Key Laboratory for Contemporary Applied Mathematics. We wish to express to all of them, as well as to the organizing institution, the *Institut Sino-Français de Mathématiques Appliquées*, our sincere thanks for their strong support. Our thanks also go to Ms. Wei Wu and Ms. Chunlian Zhou for their patient and efficient work in editing this special issue.

Let us conclude this Preface by a few words about the life and work of Luc Tartar.

Luc Tartar was born in 1946. He studied at the Ecole Polytechnique in Paris, one of the most famous schools of higher education in France. After the Ecole Polytechnique, he decided to dedicate himself to research in applied mathematics, and more especially in partial differential equations.

He prepared his thesis under the supervision of Jacques-Louis Lions. In France, at that time, the thesis was not a PhD thesis like it is now, but a much more advanced thesis which usually required five to six years of work. Luc Tartar completed his thesis in two and a half years. His thesis committee was composed of Jacques-Louis Lions, Laurent Schwartz and Jean-Pierre Serre (both Laurent Schwartz and Jean-Pierre Serre are Fields medalists).

Luc Tartar was immediately appointed as Full Professor at the University of Paris-Dauphine

at the age of 25. He then moved to the University of Paris-Sud Orsay, and later worked for five years at the Commissariat à l'Energie Atomique (CEA, the French Atomic Energy Organization). In 1987, he accepted a Full Professorship at Carnegie Mellon University in Pittsburgh, USA, where he was later awarded the special title of University Professor. He retired in 2012.

In 1987 he was elected a corresponding member of the Académie des Sciences de Paris, and in 2006 a foreign member of the Istituto Lombardo Accademia di Scienze e Lettere di Milano. He has written important articles and a series of books about Navier-Stokes equations, kinetic theory, Sobolev spaces and homogenization theory.

From the beginning of his career, Luc Tartar has had a strong interest for mechanics and physics, and has studied them with the goal of developing mathematical objects adapted to their needs. He is one of the world leading experts in partial differential equations and in the calculus of variations. He made outstanding contributions in these fields, especially in nonlinear elliptic and hyperbolic partial differential equations. Among other tools, he introduced and developed the compensated compactness theory and the notion of $H$-measures as well as the method of oscillating test-functions which is of worldwide use in homogenization theory. These notions and some others he introduced and developed are nowadays used as very natural objects and considered as classics. Without exaggeration, it can be said that the work of Luc Tartar has changed the mathematics of nonlinear partial differential equations.