

# An Introduction to Navier-Stokes Equation and Oceanography (Lecture Notes of the Unione Matematica Italiana)

By Luc Tartar



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This text corresponds to a graduate mathematics course taught at Carnegie Mellon University in the spring of 1999. Included are comments added to the lecture notes, a bibliography containing 23 items, and brief biographical information for all scientists mentioned in the text, thus showing that the creation of scientific knowledge is an international enterprise.



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Review

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"The book has its origin in a graduate course entitled 'Partial Differential Equations Models in Oceanography' presented by the author at Carnegie Mellon University in 1999. ... The main objective is to teach readers to have a critical point of view concerning the partial differential equations of continuum mechanics and to show the need for developing new adapted mathematical tools. ... Most of the theorems and lemmas are provided in the book or a corresponding reference is given. The bibliography contains 23 items." (Jürgen Socolowsky, Mathematical Reviews, Issue 2007 h)

"The book is written by a leading expert in the field and it will certainly be a valuable enhancement to the existing literature. This is a fascinating book consisting of 42 lectures which review some classical and modern aspects of Navier-Stokes Equations (NSE). ... well organized and written in a lively and provoking style. ... can be recommended to applied mathematicians and theoretical geophysicists working or interested in the field as well as being an appropriate material for graduate and postgraduate courses on the subject." (Andrzej Icha, Pure and Applied Geophysics, Vol. 165, 2008)

"The book consists of 44 lectures, completed with preface, introduction, detailed description of the lectures, bibliographical information, abbreviations and mathematical notation, references, and index. ... this book is ... a very good exposition of the topic it is dealing with. ... The course had been intended for mathematicians in the first place, in the present book form, however, it will be a welcome reading, in its larger part, also for hydrodynamicists and other researchers in the field with less specialization in functional analysis." (Tomislav Zlatanovski, Zentralblatt MATH, Vol. 1194, 2010)

#### From the Back Cover

The *Introduction to Navier-Stokes Equation and Oceanography* corresponds to a graduate course in mathematics, taught at Carnegie Mellon University in the spring of 1999. Comments were added to the lecture notes distributed to the students, as well as short biographical information for all scientists mentioned in the text, the purpose being to show that the creation of scientific knowledge is an international enterprise, and who contributed to it, from where, and when. The goal of the course is to teach a critical point of view concerning the partial differential equations of continuum mechanics, and to show the need for developing new adapted mathematical tools.

#### About the Author

Luc Tartar studied at Ecole Polytechnique in Paris, France, 1965-1967, where he was taught by Laurent Schwartz and Jacques-Louis Lions in mathematics, and by Jean Mandel in continuum mechanics.

He did research at Centre National de la Recherche Scientifique, Paris, France, 1968-1971, working under the direction of Jacques-Louis Lions for his thèse d'état, 1971.

He taught at Université Paris IX-Dauphine, Paris, France, 1971-1974, at University of Wisconsin, Madison, WI, 1974-1975, at Université de Paris-Sud, Orsay, France, 1975-1982.

He did research at Commissariat à l'Energie Atomique, Limeil, France, 1982-1987.

In 1987, he was elected Correspondant de l'Académie des Sciences, Paris, in the section Mécanique.

Since 1987 he has been teaching at Carnegie Mellon University, Pittsburgh, PA, where he has been University Professor of Mathematics since 1994.

Partly in collaboration with François Murat, he has specialized in the development of new mathematical tools for solving the partial differential equations of continuum mechanics (homogenization, compensated compactness, H-measures), pioneering the study of microstructures compatible with the partial differential equations describing the physical balance laws, and the constitutive relations.

He likes to point out the defects of many of the models which are used, as a natural way to achieve the goal of improving our understanding of mathematics and of continuum mechanics.

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