



UNIVERSITÀ DEGLI STUDI DELL'AQUILA
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International Research Center on
MATHEMATICS AND MECHANICS
OF COMPLEX SYSTEMS



LAUDATIO FOR PROFESSOR LUIGI PREZIOSI

Luigi Preziosi is Full Professor of Mathematical Physics at the Department of Mathematical Sciences (DISMA) "G. L. Lagrange" of the Politecnico di Torino, Italy, where he is the leader of the research group in "Models and Methods in Mathematical Physics".

Prof. Preziosi received a PhD in Mechanics, with a Minor in Mathematics, from the University of Minnesota (USA) in 1986, and a second PhD in Mathematics from the University of Naples (Italy) in 1989. During the years of his first PhD at the University of Minnesota, he served as a research and teaching assistant, and in 1989 he moved to the Politecnico di Torino, where he obtained a position of Researcher (Assistant Professor). From 1992 to 1993, Luigi Preziosi was Associate Professor of Mathematical Physics at the Università della Calabria, Italy, and in 1993 he went back to the Politecnico di Torino, first as Associate Professor, and then, since 2000, as Full Professor of Mathematical Physics.

In the course of his academic career, Luigi Preziosi has taught several courses at the Bachelor, Master and PhD level, and he has put a lot of effort in raising many generations of students (from his records, "more than 80 master students in the last ten years"), some of whom became his PhD students and made their career either in the academy -as professors, researchers or post-doctoral fellows in various universities or research institutes- or in the industry. His scientific collaborations involve scientists from different countries, and range over a rather wide spectrum of topics, from mechanobiology to industrial research, thereby also involving the development of various mathematical methodologies. One of the main qualities of Luigi Preziosi is his openness to new ideas and people, which has rendered his research group a rich and diversified scientific environment.

In the field of mechanobiology, Luigi Preziosi has given important contributions to the mechanics of tissues and cells, to the study of tumor growth and angiogenesis, and to the development of individual based models involving multiscale techniques.

His work has combined a careful observation of biology with the formulation of phenomenologically consistent mathematical models, especially in the case of mechanotransduction and focal adhesions, and, more generally, it has been capable of looking at biology with the eye of mathematics, and vice versa.

In the field of industrial mathematics, Luigi Preziosi's work has been concentrated on the dynamics of immiscible and non-Newtonian fluids, with special care for stability issues of the flow; on problems of gas-dynamics approached with kinetic theories; on hyperbolic problems of heat conduction, as well as on the study of the manufacturing processes involving composite materials. Luigi Preziosi's work has also involved the modeling of avalanches and the study of granular media, like sand and

soils, especially in connection with their dynamics. His approaches have ranged over various branches of Mathematical Physics, among which prominence has been given to Continuum Mechanics and Kinetic Theories.

Luigi Preziosi authored 5 books and 40 book chapters, and edited 5 books.

Moreover, he authored over 150 peer-reviewed publications with more than 140 collaborators. Some of his articles have been cited more than 100 times, and, with more than 1500 citations, his work on “heat waves” is, to date, the most cited publication of his record.

The contributions of Luigi Preziosi to science are chiefly distributed over mechanobiology and industrial mathematics. In the field of mechanobiology, and, more specifically, in the community of tumor growth mechanics, he combined the theory of reactive mixtures with the theory of media with evolving natural configurations for modeling the bulk growth of tumors. Moreover, in collaboration with the Candiolo Cancer Institute (IRCCS Candiolo, Italy) -a very prestigious hospital and research center on cancer-, Luigi Preziosi formalized the fundamental processes leading to vasculogenesis in vitro, and established methodologies for cellular invasion and segregation by the basal membrane. Finally, he extended the standard cellular Potts models available in the literature by accounting for subcellular features, such as those concerning the cell membrane and nucleus.

In the field of industrial mathematics, Luigi Preziosi discovered a method for transporting highly viscous fluids in pipes, and authored pioneering works aimed at modeling the manufacturing of various composite materials. Furthermore, he obtained two patents: one is the invention of a spinning rod tensiometer, i.e. a device that determines the interfacial tension between two immiscible fluids (U.S. Patent 4644782 and 5150607); and the other patent is a separable component of an “anti-sand barrier”, designed for preserving railways from the deposition of the sand carried by the wind in desertic zones (PCT/IT2015/000129).

Luigi Preziosi’s academic prestige has been acknowledged on several occasions.

Since 2016, he is member of the Accademia dei Lincei; from 2013 to 2016, he served as member of the Italian national committee for the evaluation of the quality of research (“VQR”); and, in 2019, he was member of the board of the Italian National Research Project (“PNR”). Moreover, he was the president of the School of Engineering Mathematics at the Politecnico di Torino from 2007 to 2018 and, since 2018, he is vice-president.

In addition to the academic service, Luigi Preziosi was also member of the scientific board of several societies, such as the European Society for Mathematical and Theoretical Biology (2002-2008), the Italian National Group of Mathematical Physics - GNFM (2008-2012). Since 2009, he has coordinated the Activity Group on “Life and Environmental Sciences” of the Italian Society of Industrial and Applied Mathematics (SIMAI), and, since 2006, he has been member of the Italian Interuniversity Center of Mathematics Applied to Biology (“CIMAB”), which he has been chairing from 2010.

Finally, Luigi Preziosi is associate editor of seven peer-reviewed, international scientific journals and member of the advisory editorial board of the book series “Lecture Notes in Mathematical Modelling in the Life Sciences (Springer)”.

Because of Luigi Preziosi's academic achievements in the fields of mechanobiology and industrial mathematics, the Scientific Committee of the Beltrami Prize for the Mathematical and Mechanical Sciences is honored to propose Luigi Preziosi as recipient of the 2021 edition of the prize.