

# CURRICULUM VITAE

## OF

### LUIGI PREZIOSI

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**Born:** Naples, October 2<sup>nd</sup>, 1961.

#### DEGREES

- laurea in Mathematics** cum laude at the University of Naples (Italy)  
earned on July 24<sup>th</sup>, 1984 with a thesis on  
“Instability problems in the interaction between  
magnetic field and convection” (Prof. G. P. Galdi).
- Ph. D. in Mechanics** with Minor in Mathematics at the University of Minnesota  
earned on December 31<sup>th</sup>, 1986 with a thesis on  
“Selected topics in the mechanics of two fluids and  
viscoelastic media” (Prof. D. D. Joseph).
- Ph. D. in Mathematics** at the University of Naples (Italy)  
earned on October 31<sup>th</sup>, 1989 with a thesis on  
“Non linear stability methods in non-Newtonian  
fluid mechanics” (Prof. S. Rionero).

## UNIVERSITY POSITIONS

**Research/Teaching Assistant** (1984–1986) in Mechanics and Fluid Mechanics  
at the University of Minnesota (U.S.A.)

**Researcher** (1989–1992) in Mathematical Physics  
at the Politecnico of Torino (Italy)

**Associate professor** (1992–2000) in Mathematical Physics  
at the University of Calabria and the Politecnico of Turin (Italy)

**Full professor:** (since 2000) in Mathematical Physics  
at the Politecnico of Torino (Italy).

## PLENARY TALKS

at the following conferences

Congress of the European Consortium of Mathematics for Industry, Latvia (2002)

Congresso dell'Unione Matematica Italiana, Milano (2003)

Congress on "Linking mathematical and biological models in cancer research", Magdeburg  
(2003)

# RESEARCH INTERESTS

The scientific activity of Luigi Preziosi is essentially devoted to the different aspects of **mathematical modelling**, from the formulation of the model, to its analytic study, simulation and validation. He has written over 80 articles published on international journals on the following topics

- **Flow and stability of immiscible liquids**
- **Flow and stability of non-Newtonian fluids**
- **Hyperbolic models in heat conduction**
- **Kinetic models in gas-dynamics**
- **Kinetic and continuous models in bio-mathematics**
- **Deformable porous media with application to composite material manufacturing and soil mechanics**

and three books

- 1- R. Monaco and L. Preziosi, **Fluid Dynamic Applications of the Discrete Boltzmann Equation**, World Scientific, 1991.
- 2- N. Bellomo and L. Preziosi, **Modelling, Mathematical Methods, and Scientific Computation**, CRC Press, (1995).
- 3- N. Bellomo, L. Preziosi and A. Romano, **Mechanics and Dynamical Systems with Mathematica**, Birkhauser, (2000).

He also devised and licenced (U. S. Patent 4644782) the spinning rod tensiometer, an instrument to measure the interfacial tension between immiscible liquids.

## LIST OF PUBLICATIONS

- 1- T. I. Hesla, F. R. Pranckh and L. Preziosi, “Squire’s theorem for two stratified fluids”, *Physics of Fluids*, **29**, 2808–2811, (1986).
- 2- L. Preziosi and D. D. Joseph, “Stokes’ first problem for viscoelastic fluids”, *Journal of Non-Newtonian Fluid Mechanics*, **25**, 239–259, (1987).
- 3- D. D. Joseph and L. Preziosi, “Stability of rigid motions and coating films in bi-component flow of immiscible liquids”, *Journal of Fluid Mechanics*, **185**, 323–351, (1987).
- 4- L. Preziosi and D. D. Joseph, “Stable configurations of two fluids between coaxial cylinders”, in **Acta of the III Meeting on Waves and Stability in Continuous Media**, Maiellaro and Palese Eds., Editrice Laterza, Bari, 351–362, (1989).
- 5- L. Preziosi and D. D. Joseph, “The run-off condition for coating and rimming flows”, *Journal of Fluid Mechanics*, **187**, 99–113, (1988).
- 6- P. Than, L. Preziosi, D. D. Joseph and M. Arney, “Measurement of interfacial tension between immiscible liquids with the spinning rod tensiometer”, *Journal of Colloid and Interface Sciences*, **124**, 552–559, (1988).
- 7- L. Preziosi, K. P. Chen and D. D. Joseph, “Lubricated pipelining: Stability of core-annular flow”, *Journal of Fluid Mechanics*, **201**, 323–356, (1989).
- 8- D. D. Joseph and L. Preziosi, “Heat waves”, *Review of Modern Physics*, **61**, 47–71, (1989).
- 9- L. Preziosi and S. Rionero “Energy stability of steady shear flows of a viscoelastic fluid”, *International Journal of Engineering Science*, **27**, 1167–1181, (1989).
- 10- L. Preziosi, “On an invariance property of the solution to Stokes’ first problem for viscoelastic fluids”, *Journal of Non-Newtonian Fluid Mechanics*, **33**, 225–228, (1989).
- 11- L. Preziosi and F. Rosso, “Stability of a viscous liquid between sliding pipes”, *Physics of Fluids/A*, **2**, 1158–1162, (1990).
- 12- D. D. Joseph and L. Preziosi, “Addendum to Heat waves”, *Review of Modern Physics*, **62**, 375–392, (1990).
- 13- L. Preziosi and F. Rosso, “Interfacial stability in a two layer shearing flow of immiscible

- liquids between sliding pipes”, *European Journal of Mechanics/B: Fluid*, **10**, 253–267, (1991).
- 14- G. P. Galdi, D. D. Joseph, L. Preziosi and S. Rionero, “Mathematical problems for miscible, incompressible fluids with Korteweg stresses”, *European Journal of Mechanics/B: Fluid*, **10**, 269–294, (1991).
  - 15- L. Preziosi and E. Longo, “On the decomposition of domains in non linear discrete kinetic theory”, in **Discrete Models of Fluid Dynamics**, Series “Advances in Mathematics for Applied Sciences”, World Scientific, Alves Ed., 144–155, (1991).
  - 16- L. Preziosi and L. M. De Socio, “A non linear inverse phase transition problem for the heat equation”, : *Math. Model Methods Appl. Sci.*, **1**, 167–182, (1991).
  - 17- R. Monaco and L. Preziosi, **Fluid Dynamic Applications of the Discrete Boltzmann Equation**, World Scientific, 1991.
  - 18- L. Preziosi, G. Teppati and N. Bellomo, “Modelling and solution of stochastic inverse problems in mathematical physics”, *Mathematical and Computer Modelling*, **16**, 37–51, (1992).
  - 19- L. Preziosi, “Thermal creep problem by the discrete Boltzmann equation”, *Transport Theory and Statistical Physics*, **21**, 183–209, (1992).
  - 20- Z. Brzezniak, F. Flandoli and L. Preziosi, “On the discrete Boltzmann equation with multiple collisions”, *Stability and Nonlinear Analysis in Continuous Media*, **2**, 153–181, (1992).
  - 21- N. Bellomo, J. Polewczak and L. Preziosi, “Liapunov functionals and qualitative behaviour of the solution to the nonlinear Enskog equation”, in **Developments in Partial Differential Equations and Applications to Mathematical Physics**, G. Buttazzo, G.P. Galdi and L. Zanghirati Eds., Plenum Press, 1–13, (1992).
  - 22- E. Longo, L. Preziosi and N. Bellomo, “The semicontinuous Boltzmann equation: Towards a model for fluid dynamic applications”, : *Math. Model Methods Appl. Sci.*, **2**, 65–93, (1992).
  - 23- L. Preziosi, “An inverse source–sink problem for the nonlinear heat equation” *Mathl. Comp. Modelling*, **17**, 3–11, (1993).
  - 24- L. Preziosi, “Knudsen layer analysis by the semicontinuous Boltzmann equation”, in

**Nonlinear Kinetic Theory and Mathematical Aspects of Hyperbolic Problems**, V. Boffi Ed., World Scientific, (1993).

- 25- L. Preziosi, “The semi-continuous Boltzmann equation for gas mixtures”, : *Math. Model Methods Appl. Sci.*, **3**, 665–680, (1993).
- 26- N. Bellomo and L. Preziosi, “Mathematical methods in metrology: Modeling and solution methods”, in **Advances in Mathematical Tools in Metrology**, World Scientific, 23–36, (1994).
- 27- N. Bellomo and L. Preziosi, **Modelling, Mathematical Methods, and Scientific Computing**, CRC Press, (1995).
- 28- L. Preziosi, “From population dynamics to modelling the competition between tumors and immune system”, *Math. Comp. Modelling*, **23**, 135–152, (1996).
- 29- N. Bellomo, L. Preziosi and G. Forni, “On a kinetic (cellular) theory for competition between tumors and the host immune system”, *J. Biological Systems*, **4**, 479–502, (1996).
- 30- L. Preziosi, “The theory of deformable porous media and its application to composite materials manufacturing”, *Surveys in Mathematics for Industry*, **6**, 167–214, (1996).
- 31- L. Preziosi, D.D. Joseph and G. Beavers, “Infiltration of initially dry, deformable porous media”, *Int. J. Multiphase Flows*, **22**, 1205–1222, (1996).
- 32- N. Bellomo, L. Preziosi and G. Forni, “Dynamics of Tumor immune system interactions: The kinetic cellular theory”, in **Survey of Models for Tumor Immune System Dynamics**, 135–186, Birkhäuser, Boston (1996).
- 33- N. Bellomo, B. Firmani, L. Guerri and L. Preziosi, “On a kinetic theory of cytokine-mediated interaction between tumors and immune system”, *ARI Journal*, **1**, 21–32, (1997).
- 34- A. Farina and L. Preziosi, “Flow of waxy crude oils”, in *Progress in Industrial Mathematics*, M. Brøns, M.P. Bendsøe, and M.P. Sørensen Eds., Teubner, Stuttgart, (1997), 306–313.
- 35- D. Ambrosi and L. Preziosi, “Modelling industrial processes involving infiltration in deformable porous media”, in *Progress in Industrial Mathematics*, M. Brøns, M.P. Bendsøe, and M.P. Sørensen Eds., Teubner, Stuttgart, (1997), 110–117.

- 36- R. Lancellotta and L. Preziosi, “A general nonlinear mathematical model for soil consolidation problems”, *Int. J. Engng. Sci.*, **35**, 1045–1063, (1997).
- 37- L. Preziosi and E. Longo, “On a conservative polar discretization of the Boltzmann equation”, *Japan J. Industr. Appl. Math.*, **14**, 399–435, (1997).
- 38- D. Ambrosi and L. Preziosi, “Modelling matrix injection through elastic porous preforms”, *Composites A*, **29**, 5–18, (1998).
- 39- S. Arnod, M. Battaglio, N. Bellomo, D. Costanzo, R. Foti, R. Lancellotta and L. Preziosi, “A consistent macroscopic mathematical model for soil consolidation problems”, in **Geotechnical Hazard**, M. Bozica, L. Zvonimir and S. Antun Eds., Balkema Publ. Rotterdam, 157–171, (1998).
- 40- B. Firmani, L. Guerri and L. Preziosi, “Tumor/immune system competition with medically induced activation/deactivation”, *Math. Models Methods Appl. Sci.*, **9**, 491–512 (1999).
- 41- L. Preziosi and L. Rondoni, “Conservative energy discretization of Boltzmann collision operator”, *Quarterly of Applied Mathematics*, **57**, 699–721, (1999).
- 42- S. Arnod, M. Battaglio, N. Bellomo, D. Costanzo, R. Lancellotta and L. Preziosi, “Finite deformation models and field performance”, *Transport in Porous Media*, **34**, 17–22, (1999).
- 43- A. Farina and L. Preziosi, “Infiltration processes in composite materials manufacturing: Modelling and qualitative results”, in **Complex Flows in Industrial Processes** A. Fasano, Ed., Birkhauser, 281–306, (2000).
- 44- K. Markov and L. Preziosi, Eds., **Heterogeneous Solids: Micromechanics, Modelling, Methods, and Simulations**, Birkhäuser, Boston, (2000).
- 45- A. Farina and L. Preziosi, “Deformable porous media and composites manufacturing”, in **Heterogeneous Solids: Micromechanics, Modelling, Methods, and Simulations**, K. Markov and L. Preziosi, Eds., Birkhäuser, Boston, 321–410, (2000).
- 46- A. Farina and L. Preziosi, “Infiltration of a polymerizing resin in a deformable preform for fiber reinforced composites”, in **Applied and Industrial Mathematics, Venice 2**, R. Spigler Ed., Kluwer Academic Publisher, Dordrecht, 259–271, (2000).
- 47- N. Bellomo, L. Preziosi, and N. Romano, **Mechanics and Dynamical Systems**

- with **Mathematica**, Birkhäuser, (2000).
- 48- E. De Angelis and L. Preziosi, “Advection-diffusion models for solid tumour evolution in vivo and related free boundary problem”, *Mathematical Models and Methods in Applied Sciences*, **10**, 379–408, (2000).
- 49- N. Bellomo and L. Preziosi, “Conceptual frameworks on the modelling of tumor heterogeneity and progression”, in **La Matematica nelle Scienze della Vita e Nelle Applicazioni**, G.L. Agnoli, M. Fabrizio, C. Vettori Ed., Pitagora Editrice, Bologna, 129–140, (2000).
- 50- D. Ambrosi and L. Preziosi, “Modelling injection moulding processes with deformable porous preforms”, *SIAM J. Appl. Math.*, **61**, 22–42, (2000).
- 51- A. Farina and L. Preziosi, “Non-isothermal injection moulding with resin cure and preform deformability”, *Composites A*, **31**, 1355–1372, (2000).
- 52- N. Bellomo and L. Preziosi, “Modelling and mathematical problems related to tumor evolution and its interaction with the immune system” *Math. Comput. Modelling*, **32**, 413–452, (2000).
- 53- R. Lancellotta, G. Musso and L. Preziosi, “A three-dimensional nonlinear model for soil consolidation”, **Theoretical and Numerical Methods in Continuum Mechanics of Porous Media**, W. Ehlers, Ed., Kluwer Academic Publisher, Dordrecht, 365–378, (2001).
- 54- L. Preziosi and A. Farina, “On Darcy’s law for growing porous media”, *Int. J. Non-linear Mech.*, **37**, 485–491, (2001).
- 55- D. Ambrosi, R. Lancellotta and L. Preziosi, “Mathematical models for soil consolidation problems: A state-of-the-art report”, in **Modeling and Mechanics of Granular and Porous Materials**, G. Capriz, V.N. Ghionna, P. Giovine, Eds., Birkhauser, 159–180, (2002).
- 56- D. Ambrosi, A. Farina and L. Preziosi, “Recent developments and open problems in composites materials manufacturing” in **Progress in Industrial Mathematics**, A.M. Anile, V. Capasso, and A. Greco, Eds., Springer, 475–487, (2002).
- 57- L. Preziosi e L. Rondoni, “Conservative discretization of the Boltzmann equation and the semicontinuous model”, in **Lecture Notes on the Discretization of the**

- Boltzmann Equation**, N. Bellomo e R. Gatignol, Eds., Chapman Hall/CRC Press, 56–95, (2002).
- 58- D. Ambrosi, N. Bellomo and L. Preziosi, “Modelling tumor progression, heterogeneity and immune competition”, *J. Theoret. Medicine*, **4**, 51–65, (2002).
- 59- D. Ambrosi and L. Preziosi, “On the closure of mass balance models for tumour growth”, *Mathematical Models and Methods in Applied Sciences*, **12**, 737–754, (2002).
- 60- H.M. Byrne, J.R. King, D.L.S. McElwain and L. Preziosi, “A two-phase model of solid tumor growth”, *Appl. Math. Letters*, **16**, 567–573, (2003).
- 61- A. Gamba, D. Ambrosi, A. Coniglio, A. de Candia, S. di Talia, E. Giraud, G. Serini, L. Preziosi e F. Bussolino, “Percolation, morphogenesis, and Burgers dynamics in blood vessel formation”, *Phys. Rev. Letters*, **90**, 118101, (2003).
- 62- G. Serini, D. Ambrosi, E. Giraud, A. Gamba, L. Preziosi e F. Bussolino, “Modelling the early stages of vascular network assembly”, *EMBO J.*, **22 (8)**, 1771–1779, (2003).
- 63- L. Graziano e L. Preziosi, “Multiphase models of tumour growth: General framework and particular cases”, in **Mathematical Modelling and Computing in Biology and Medicine**, V. Capasso Ed., Società Editrice Esculapio, Milano, 622-628, (2003).
- 64- A. Gamba, D. Ambrosi, E. Giraud, G. Serini, L. Preziosi e F. Bussolino, “Growth of endothelial cell networks and Burgers dynamics”, in **Mathematical Modelling and Computing in Biology and Medicine**, V. Capasso Ed., Società Editrice Esculapio, Milano, 518-525, (2003).
- 65- L. Preziosi, Ed., **Cancer Modelling and Simulation**, Chapman & Hall/CRC Press, (2003).
- 66- N. Bellomo, E. De Angelis and L. Preziosi, “Multiscale modelling and mathematical problems related to tumor evolution and medical therapy”, *J. Theor. Med.*, **5**, 111-136 (2004).
- 67- L. Preziosi, “Modeling tumor growth and progression”, in **Progress in Industrial Mathematics at ECMI 2002**, A. Buikis, R. Ciegis, and A.D. Fitt, Eds., Springer, 53–66, (2004).
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- 220, (2004).
- 69- H.M. Byrne and L. Preziosi, “Modeling solid tumour growth using the theory of mixtures”, *Math. Med. Biol.*, **20**, 341–366, (2004).
- 70- L. Preziosi, “Modelli matematici a sostegno della ricerca contro il cancro”, *Boll. UMI Ser. VIII*, **8-B**, 55–76, (2005).
- 71- D. Ambrosi, F. Bussolino and L. Preziosi, “A review of vasculogenesis models”, *J. Theor. Med.*, **6**, 1–19, (2005).
- 72- C. Bertini and L. Preziosi, “La matematica nel sangue”, in **Matematica e Cultura 2005**, M. Emmer, Ed., Springer, 189–198, (2006).
- 73- M. Chaplain, L. Graziano and L. Preziosi, “Mathematical modelling of the loss of tissue compression responsiveness and its role in solid tumour development”, *Math. Med. Biol.*, **23**, 197–229, (2006).
- 74- L. Preziosi and S. Astanin, “Modelling the formation of capillaries”, in **Complex Systems in Biomedicine**, A. Quarteroni, L. Formaggia, A. Veneziani, Eds., Springer, 109–145 (2006).
- 75- A. Tosin, D. Ambrosi and L. Preziosi “Mechanics and chemotaxis in the morphogenesis of vascular networks” *Bull. Math. Biol.*, **68**, 1819-1836, (2006)
- 76- S. Astanin, L. Preziosi and A. Tosin, “Modelling tumour cord growth along the source of nutrient”, *Elektronnyi zhurnal Issledovano v Rossi* **48**, 478–487 (2006). In Russian. <http://zhurnal.ape.relarn.ru/articles/2006/048.pdf>,
- 76- V. Lanza, D. Ambrosi and L. Preziosi, “Exogenous Control of Vascular Network Formation in Vitro: A Mathematical Model” *Networks Heterogeneous Media*, **1**, 621–637 (2006).
- 77- L. Preziosi, “Hybrid and multiscale modelling”, *J. Math. Biol.*, **53**, 977-978, (2006).
- 78- F. Mollica, L. Preziosi and K.R. Rajagopal, Eds., **Modelling of Biological Materials**, Birkhäuser (2007).
- 79- L. Graziano and L. Preziosi, “Mechanics in Tumor Growth”, in **Modelling of Biological Materials**, F. Mollica, K.R. Rajagopal, and L. Preziosi, Eds., Birkhäuser, 267–328, (2007).
- 80- A. Chauviere, T. Hillen and L. Preziosi, “A continuum model for mesenchymal motion

- in a fibrous network”, *Networks Heterogeneous Media*, **2**, (2007).
- 81- A. Chauviere, T. Hillen and L. Preziosi, “Modelling the motion of a cell population in the extracellular matrix”, *Discr. Cont. Dyn. Sys. B*, , (2007).
- 82- L. Preziosi, “Biomatematica” VII Appendice - XXI Secolo - Enciclopedia Treccani, vol. 1, (2007).