

## ELISABETTA ROCCA, CURRICULUM VITAE

### CONTACT

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Born in Broni (Pavia) 8.28.1976, Italian citizenship

### RESEARCH FIELDS

- **Main areas:** Analysis of Partial Differential Equations, Continuum Thermomechanics, Fluid mechanics, Biological problems, in particular:
  - Well-posedness of PDE systems arising from phase transition-separation phenomena and from medical-biological problems like tumor growth phenomena
  - Existence of solutions for coupled Navier-Stokes systems
  - Nonlocal effects in phase transitions phenomena
  - Long time behaviour and study of the attractors for nonlinear/singular phase-field systems
  - Inverse problems: identification of memory kernels in PDE systems
  - Optimal Control Problems for nonlinear PDE systems applied to Biology, Mechanics and Fluid Dynamics

### EDUCATION

- Ph.D. in *Matematica e Calcolo Scientifico*, the February 19, 2004, University of Pavia, Italy, with the thesis: “Some phase field models of Penrose-Fife type”, advisor Prof. Gianni Gilardi.
- SAFI Advanced School, Institute for Advanced Study - IUSS, Pavia, the December 16, 2002.
- *Laurea in Matematica*, the July 1, 1999, University of Pavia, Italy, Grade: 110/110 cum laude with the thesis: “Analisi asintotica rispetto al parametro di rilassamento in tempo di un modello di campo di fase conservativo con memoria”, advisor Prof. Pierluigi Colli.

## POSITIONS

- March 2016 - present: *Associate Professor* at the Department of Mathematics of the University of Pavia, Italy.
- November 2012 - present: *Research associate* at the IMATI - CNR, Pavia, Italy.
- October 2013 - February 29, 2016: *Head of research group Entropy Formulation of Evolutionary Phase Transitions* at the Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany.
- November 2010 - February 29, 2016: *Associate Professor* at the Department of Mathematics of the University of Milan, Italy, on leave since October 1st, 2013.
- January 2004 - October 2010: *Researcher* (permanent) at the Department of Mathematics of the University of Milan, Italy.
- June - December 2003: *postdoc* position (assegno di ricerca) University of Pavia, Italy, under the supervision of Prof. Gianni Gilardi.

## HONORS AND AWARDS

- Invited speaker at the 7th European Congress of Mathematics, Berlin, July 18 - 22, 2016.
- Qualified as Full Professor at the National Scientific Qualification in Italy (*Professore Ordinario*) (Validity: 30/12/2013 – 14/11/2020).
- *Junior ISIMM Price 2014*, from the International Society for the Interaction of Mechanics and Mathematics (ISIMM) on November 12, 2013.
- *Principal Investigator* of the Project **ERC Starting Independent Research Grant 2010** “Entropy formulation of evolutionary phase transitions - EntroPhase”, April 1st 2011 – present. Funded for € 659.784,88.
- *Junior researcher* at the *Necas Center for Mathematical Modelling* - From October 22, 2007 till November 22, 2007 - Prague, Czech Republic.
- SAFI - IUSS prizes in 2001 and 2002.
- “Luigi Berzolari” price for the best Thesis in Mathematics of at the University of Pavia of September 1998 - August 1999.

## VISIT AND RESEARCH EXPERIENCES

For periods going from one to four weeks

- 2016: Erwin Schroedinger International Institute - ESI, Vienna (Austria).
- 2015: Durham University (UK).
- 2013: Fudan University, Shanghai, (China).
- 2012: Mathematical Department of the University of Bath (UK).

- 2008-09: Mathematical Institute of the Academy of Sciences, Prague (Czech Republic).
- 2007: Junior researcher at the *Necas Center for Mathematical Modelling*, Prague (Czech Republic).
- From 2004 to 2017: at the “Wierstrass Institute for Applied Mathematics and Stochastics” - WIAS, Berlin (Germany).
- 2003: “Laboratoire Central des Ponts et Chaussées”, Paris (France).

#### COORDINATION AND PARTICIPATION TO RESEARCH PROJECTS

- ◇ **Principal Investigator** of the Project ERC Starting Independent Research Grant 2010 “Entropy formulation of evolutionary phase transitions - EntroPhase”, April 1st 2011– Funded for € 659.784,88, with three PostDocs hired on the Project.
- ◇ **Scientific Coordinator** of the Fondazione Cariplo-Regione Lombardia project MEGASTAR “Matematica d’Eccellenza in biologia ed ingegneria come acceleratore di una nuova strategia per l’Ateneo pavese”, October 2016– Funded for € 200.000.
- ◇ **Coordinator** of the Italian Project Gnampa 2010 *Analisi di modelli ad interfaccia diffusa di fluidi interagenti*.
- ◇ **Coordinator** of the Italian Project Pur 09 *Analisi matematica e stocastica di modelli applicativi*, at the l’Università degli Studi di Milano.
- Participant to the Romanian-Italian project: “Equazioni alle derivate parziali (EDP) non lineari con applicazioni a modelli di crescita delle cellule, chemotassi e transizione di fase” funded two times: for three years: 2017-20 and for three years: 2014-16 from CNR and RA.
- Participant to the Italian Project Prin 08 *Problemi inversi per equazioni di evoluzione*, coordinated by Giovanni Alessandrini.
- Participant to the Italian Project Gnampa 2009 *Analisi matematica di formulazioni energetiche ed entropiche per problemi non-smooth in termomeccanica*, coordinated by Elena Bonetti.
- Participant to the Project 2008 *Modelli matematici in scienza dei materiali Modèles mathématiques en science des matériaux*, in the framework of the Program Galileo of scientific cooperation Italia-Francia, coordinated by Giulio Schimperna (coordinator of the french part: Alain Miranville, University of Poitiers).
- Participant to the Italian Project Gnampa 2008 *Equazioni di evoluzione nelle scienze dei materiali come sistemi dinamici infinito-dimensionali*, coordinated by Giulio Schimperna.
- Participant to the Italian Project Prin 04 “Problemi di identificazione per equazioni e sistemi di evoluzione differenziali ed integrodifferenziali, lineari e non lineari ”, coordinated by Giovanni Alessandrini.

## ORGANIZING EXPERIENCES

Co-organizer of the events:

1. Workshop: “Analysis of Boundary Value Problems for PDEs. An afternoon in honor of Gianni Gilardi on the occasion of his 70th birthday”, Pavia, February 20, 2017.
2. “Special Afternoon on Diffuse Interface Models and Related Problems”, IMATI-CNR, Pavia, February 7, 2017.
3. INDAM-ISIMM Workshop Trends on Applications of Mathematics to Mechanics, Rome, September 5-9, 2016.
4. Special Session “Control and Asymptotics of Nonlinear PDE Dynamics” of the “First Joint Meeting Brazil-Italy in Mathematics”, Rio de Janeiro, August 29-September 2, 2016.
5. Indam Meeting - OCERTO 2016 - Optimal Control for Evolutionary PDEs and Related Topics, Palazzone, Cortona - Italy, June 20-24, 2016.
6. ERC Workshop - MoMatFlu - Modeling materials and fluids using variational methods, WIAS - Berlin, February 22-26, 2016.
7. Perspectives in Applied PDEs: a day in Pavia, February 9, 2016.
8. Workshop PDE2015 - Theory and Applications of Partial Differential Equations, WIAS - Berlin, November 30-December 4, 2015.
9. CIME Course on “Mathematical Thermodynamics of complex fluids”, Cetraro - Italy, June 29-July 3, 2015.
10. Indam-ERC Workshop “Special materials in complex systems”, INDAM, Rome - May 18-22, 2015.
11. Special Session *Applied analysis* of the GAMM 86th Annual Scientific Conference, Lecce, March 23-27, 2015.
12. Special Session “*Variational energy and entropy approaches in non-smooth thermomechanics*” of the 10th-AIMS Conference on Dynamical Systems, Differential Equations and Applications, Madrid, July 07–11, 2014.
13. RIPE60 – *Rate Independent Processes and Evolution – Workshop on the occasion of Pavel Krejci 60th birthday*, Mathematical Institute of the Czech Academy of Sciences, Prague, June 24–26, 2014.
14. *International Conference: “Two Days Workshop on LC-flows”*, IMATI, CNR, Pavia, March 24-25, 2014.
15. *CIRM-ERC Workshop “DIMO-2013” Diffuse Interface Models*, Levico Terme - Italy, September 10-13, 2013.
16. Minisymposium MS13: *Coupled Variants of the Cahn-Hilliard Equation* of the Equadiff Conference, 2013, Prague, August 25-31, 2013.

17. *International School on "Recent advances in partial differential equations and applications"*, Università degli Studi di Milano, Milan, June 17-22, 2013.
18. *Spring School on "Rate-independent evolutions and hysteresis modelling"*, Università degli Studi di Milano, Milan, May 27-31, 2013.
19. Workshop *PDEs for multiphase advanced materials - ADMAT2012*, Cortona - Italy, September 17-21, 2012.
20. Workshop INDI2011 *Interfaces and discontinuities in Solids, Liquids and Crystals*, Gargnano - Italy, June 20-23, 2011.
21. Meeting on *Direct, Inverse and Control Problems for PDE's (DICOP)*, Cortona - Italy, September 22-26, 2008.
22. Workshop *Direct, Inverse and Control Problems for PDE's (DICOP)*, Rome, June 25-28, 2007.
23. Workshop "Inverse and Control Problems for PDE's (ICOP)", Rome, March 13-16, 2006.
24. Meeting on "Inverse and Direct Problems", Cortona, - Italy, June 20-24, 2005.

#### THESES SUPERVISION, POST-DOCS SUPERVISION, AND PHD PROGRAMMES

- Coordinator of three Master Thesis in Mathematics at the University of Milan:
  - 2010. Manuela Girotti. Title: "*Time relaxation of a phase-field model with entropy balance*". Mark: 110/110 and honors. Presently: Post-doctoral Fellow at Colorado State University.
  - 2011. Luisa Marini. Title: "*Buona positura e comportamento per tempi lunghi di un'equazione di Allen-Cahn iperbolica con condizione al bordo dinamica*". Mark: 110/110.
  - 2014. Stefano Melchionna. Title: "*L'equazione di Cahn-Hilliard nonlocale con reazione: esistenza, unicità e regolarità*". Mark: 110/110 and honors. Presently: PhD student at the University of Vienna.

and of two Degree Theses (in a.y. 2008/2009) at the University of Milan.

- ◇ Supervisor of three post-docs from 2011 till now: Michela Eleuteri 2012/2013 (presently Researcher (type B) at the University of Modena), Sergio Frigeri 2011/2015, Riccardo Scala May 2015-August 2016 (presently post-doc at the University of Lisboa).
- ◇ Member of the BMS (Berlin Mathematical School) in Berlin since 2014.
- ◇ Member of the PhD programme in Mathematics of the University of Milan since 2010.

## INSTITUTIONAL RESPONSABILITIES, MEMBERSHIP OF SCIENTIFIC SOCIETIES AND COMMISSIONS OF TRUST

- ◇ Member of the Executive Committee of ISIMM – The International Society for the Interaction of Mechanics and Mathematics.
- ◇ Member of the Scientific Societies: GAMM, ISIMM, SIMAI, Gnampa of INDAM, UMI – Unione matematica italiana.
- ◇ 2017 – Member of the Scientific Commission of “INROAd”: a commission encouraging new applications for ERC and Horizon call at the University of Pavia.
- ◇ 2004 – 2016 Faculty member of the University of Milan.
- ◇ 2014 – Member of the Scientific Board of the BMS (Berlin Mathematical School), Berlin.
- ◇ 2010 – Member of the PhD Board of the Mathematical Department, University of Milan.
- ◇ 2011–2013 co-Organizer of the “Seminari di Dipartimento” and Member of the “Giunta di Dipartimento” (2012) at the Mathematical Department of the University of Milan.
- ◇ 2014– Reviewer/Evaluator for the Italin Funds: “Futuro in Ricerca” and SIR and for the CONICYT - Chilean Commission for Scientific and Technological Research.

## EDITORIAL AND REFEREE EXPERIENCES

- ◇ **Editor** of four special volumes of the international journals *Discrete Contin. Dyn. Syst. Ser. S* (2011, 2013, 2015), *Discrete Contin. Dyn. Syst.* (2015).
- ◇ **Reviewer/Evaluator** for the Italin Funds: “Futuro in Ricerca” and SIR and for the CONICYT - Chilean Commission for Scientific and Technological Research.
- ◇ **Referee** (among the others) for the Journals: *Advances in Differential Equations*, *Advances in Mathematical Sciences and Applications*, *Advances in Nonlinear Analysis*, *Annali di Matematica Pura ed Applicata*, *Banach Center Publications*, *Communications on Pure and Applied Analysis*, *Differential and Integral Equations*, *Discrete and Continuous Dynamical Systems*, *International Journal of Differential Equations*, *Journal of Differential Equations*, *Journal of Evolution Equations*, *Mathematical Methods in the Applied Science*, *Mathematical Modelling and Numerical Analysis*, *Nonlinear Analysis: Modelling and Control*, *Nonlinear Analysis Series A: Theory, Methods & Applications*, *SIAM Journal on Control and Optimization*, *SIAM Journal on Mathematical Analysis*, *Zeitschrift fuer Angewandte Mathematik und Physik*, *Reviewer for Mathematical Reviews*

## INVITED SEMINARS

1. May 4, 2017: *Optimal Control in Diffuse Interface Models of Tumor Growth*, WIAS, Berlin, Germany.
2. January 25, 2017: *ERC Candidate@Unipv: esperienze a confronto e progettazione futura*, Pavia.

3. October 27, 2015: *Existence of weak solutions and asymptotics for some diffuse interface models of tumor growth*, WIAS, Berlin.
4. March 13, 2015: *Optimal control of a nonlocal convective Cahn-Hilliard equation by the velocity*, Durham University, UK.
5. January 27, 2014: *Entropic solutions for systems of PDEs arising in complex fluids dynamics*, WIAS Colloquium, WIAS, Berlin.
6. January 30, 2013: *Weak formulation of a nonlinear PDE system arising from models of phase transitions and damage*, University of Milano Bicocca, Italy.
7. December 4, 2012: *Weak solutions for a degenerating PDE system for phase transitions and damage*, University of Bath, UK.
8. May 15, 2012: *Recent results on the evolution of liquid crystals flows*, WIAS, Berlin.
9. February 8, 2011: *On a quasilinear multi-phase system with nonconstant specific heat and heat conductivity*, WIAS, Berlin.
10. November 16, 2010: *On a non-isothermal model for nematic liquid crystals*, WIAS, Berlin.
11. October 27, 2010: *A diffuse interface model for two phase compressible fluids*, at “Langenbach-Seminar”, WIAS, Berlin.
12. November 4, 2008: *Degenerating PDEs for phase transitions in thermoviscoelastic materials*, WIAS, Berlin.
13. August 29, 2007: *Analysis of a nonlinear degenerating PDE system for phase transitions in thermoviscoelastic materials*, WIAS, Berlin.
14. October 25, 2006: *A dual formulation for a class of phase-field systems: existence and long-time behaviour of solutions* at the “Langenbach-Seminar”, WIAS, Berlin.
15. January 10, 2006: *Modelli di transizione di fase non locali*, at the “Seminario di Matematica Applicata”, IMATI-CNR, Pavia.
16. November 24, 2004: *Existence of a global attractor for some singular phase transitions systems*, at the “Langenbach-Seminar”, WIAS, Berlin.
17. November 6, 2003: *Universal attractor for some singular phase transition systems*, University of Poitiers, Poitiers.

#### INVITED LECTURES TO INTERNATIONAL CONFERENCES

1. June 27, 2017: *Optimal control in diffuse interface models of tumor growth*, 37ème Colloque de la Société Francophone de Biologie Théorique, Poitiers, France.
2. March 7, 2017: *Diffuse interface models in Biology*, Annual Meeting of GAMM - Contributed Session: Applied Analysis, Weimar, Germany.
3. October 13, 2016: *On some diffuse interface models of multispecies tumor growth*, Eleventh Workshop on Mathematical Modelling of Environmental and Life Sciences Problems, Constanta, Romania.

4. September 14, 2016: *Diffuse and sharp interfaces in Biology and Mechanics*, SIMAI 2016, Milan Politecnico, Italy.
5. July 18, 2016: *Diffuse interface models in Biology and Mechanics*, 7th European Congress of Mathematics, Berlin, Germany.
6. September 22, 2015: *On some diffuse interface models of tumour growth*, Mini Symposium "Mathematics of fluid interfaces", DMV, Hamburg, Germany.
7. April 13, 2015: *Choosing the velocity as control in a nonlocal convective Cahn-Hilliard equation*, Workshop on Control Theory and related topics, Milan Politecnico, Italy.
8. September 9, 2014: *"Entropic" solutions to a thermodynamically consistent PDE system for phase transitions and damage*, at the STAMM 2014 Meeting, Poitiers, France.
9. February 26, 2014: *Non-isothermal two phase flows of incompressible fluids*, at the DFGCNRS Workshop Two-Phase Fluid Flows. Modeling, Analysis, and Computational Methods, Paris, France.
10. October 11, 2013: *On a non-isothermal diffuse interface model for two phase flows of incompressible fluids*, at the ERC-Workshop on Energy/Entropy-Driven Systems and Applications, Berlin, Germany.
11. August 27, 2013: *A Nonlocal Model  $H$  with Nonconstant Mobility*, at the Minisymposium MS13: Coupled Variants of the Cahn-Hilliard Equation of the Equadiff Conference, 2013, Prague, Czech Republic.
12. June 29, 2013: *Solutions to a full model for thermoviscoelastic material*, al Joint International Meeting of the American Mathematical Society and the Romanian Mathematical Society, Alba Iulia, Romania.
13. May 14, 2013: *Optimal control of multifrequency induction hardening*, at the IFIP TC 7.2 Workshop Electromagnetics "Modelling, Simulation, Control and Industrial Applications", WIAS, Berlin, Germany.
14. March 27, 2013: *Existence and long-time dynamics of a nonlocal Cahn-Hilliard-Navier-Stokes system with nonconstant mobility* at the Oberwolfach Workshop "Interfaces and Free Boundaries: Analysis, Control and Simulation", Oberwolfach, Germany.
15. September 10, 2012: *A degenerating PDE system for phase transitions and damage: global existence of weak solutions*, at the Congress "Variational Models and Methods for Evolution", Levico, Trento, Italy.
16. July 1, 2012: *Degenerating PDE system for phase transitions and damage*, alla "9th AIMS Conference on Dynamical Systems, Differential Equations and Applications", Orlando, Florida, USA.
17. July 5, 2012: *Evolution of non-isothermal nematic liquid crystals flows*, alla "9th AIMS Conference on Dynamical Systems, Differential Equations and Applications", Orlando, Florida, USA.
18. June 15, 2012: *Weak formulations of PDEs in thermomechanics*, PLENARY SPEAKER alla "12th International Conference on Free Boundary Problems Theory and Applications", Chiemsee, Germany.



19. April 19, 2012: *Weak formulation of a degenerating PDE system for phase transitions and damage*, at the Congress MathProSpeM2012, Rome, Italy.
20. September 14, 2011: *Analysis of a non-isothermal model for nematic liquid crystals*, at the 25th IFIP TC 7 Conference 2011 - System Modeling and Optimization, Berlin, Germany.
21. December 18, 2010: *A non-isothermal model for nematic liquid crystals*, at the “Workshop on the occasion of 5th anniversary of the foundation of Jindrich Necas Center for Mathematical Modeling”, Prague, Czech Republic.
22. September 4, 2010: *Degenerating PDE’s for phase transitions in thermoviscoelastic materials*, at the Congress “PDE’s, semigroup theory and inverse problems”, Bologna, Italy.
23. May 27, 2010: *Liquid-solid phase transitions in a deformable container*, at the “8th AIMS International Conference on Dyn. Systems, Diff. Equations and Applications”, Dresden, Germany.
24. July 10, 2009: *A model of phase-field for two-phase compressible fluids*, at the Workshop “Mathematical Models and Analytical Problems for Special Materials”, Brescia, Italy.
25. July 2, 2009: *A bottle in a freezer*, at the Congress “EEMMAS Evolution Equations and Mathematical Models in the Applied Sciences”, Taranto., Italy.
26. October 24, 2008: *Weak solutions to Frémond’s full model of phase transitions*, at the “International WORKSHOP Phase Transitions and Optimal Control”, WIAS, Berlin, Germany.
27. May 19, 2008: *Some results on phase change models with microscopic movements* at “AIMS’ Seventh International Conference on Dynamical Systems, Differential Equations, and Applications”, Arlington, Texas, USA.
28. October 28, 2007: *A nonlinear degenerating PDE system for phase transitions in thermoviscoelastic materials*, at the *International Conference on Free Boundary Problems. Nonlinear Phenomena with Energy Dissipation: Mathematical Analysis, Modelling and Simulation*, Chiba, Japan.
29. November 1, 2007: *A new dual approach for a class of phase transitions with memory*, at the Workshop *Fluid-Structure Interactions and Related Topics*, at the Necas Center for Mathematical Modelling, Prague, Czech Republic.
30. September 18, 2006: *Asymptotic analyses of singular phase-field models*, at the Meeting *Evolution Equations: Direct and Inverse Problems*, Bologna, Italy.
31. July 15, 2006: *Long-time behaviour of solutions of a singular integro-differential phase-field system*, at the meeting “Mathematical Models and Analytical Problems for Special Materials”, in Salò, Italy.
32. June 25, 2006: *Nonlocal phase field models*, at “AIMS’ Sixth International Conference on Dynamical Systems, Differential Equations, and Applications”, in Poitiers, France.
33. June 24, 2004: *Evolution equations arising from nonlocal phase separation models*, at the meeting “Evolution equations: Inverse and Direct Problems” in Cortona, Italy.

34. November 30, 2005: *Phase change with voids and bubbles*, at the meeting “Dynamics of Phase Transitions”, WIAS, Berlin, Germany.
35. June 17, 2004: *Universal attractor for some phase transition systems of Penrose-Fife type*, at the “AIMS’ fifth international conference on dynamical systems and differential equations” at Pomona, California, USA.
36. June 28, 2001: *Modello di campo di fase di Penrose-Fife conservativo con memoria*, at the meeting “Modelli matematici e problemi analitici per materiali speciali”, Cortona, Italy.

## PUBLICATIONS

Co-author of **84 papers** (6 as single author): 70 paper published (since 2000 up to now) in international peer-reviewed journals, 6 papers to appear in international peer-reviewed journals, 4 papers published in peer-reviewed conference proceedings or international volumes, 4 preprints. Co-editor of 5 International Volumes published on international journals.

Cited 425 times by 197 authors. Co-author of 33 researchers. H-index 18 according to Google Scholar.

## PUBLISHED PAPERS ON INTERNATIONAL JOURNALS

1. E. ROCCA: *Asymptotic Analysis of a conserved Phase-Field Model with memory for vanishing time relaxation*, Adv. Math. Sci. Appl., **10** (2000), 899–916.
2. E. ROCCA: *The Conserved Penrose-Fife Phase Field Model with Special Heat Flux Laws and Memory Effects*, J. Integral Equations Appl., **14** (2002), 425–466.
3. G. GILARDI, E. ROCCA: *Su un modello conservativo di tipo Penrose-Fife con condizioni di Neumann*, Istituto Lombardo (Rend. Sc.) A, **136-137** (2002–2003).
4. E. ROCCA, G. SCHIMPERNA: *The Conserved Penrose-Fife system with Fourier heat flux law*, Nonlinear Anal., **53** (2003), 1089–1100.
5. E. ROCCA, G. SCHIMPERNA: *Singular Limits of a Conserved Penrose-Fife phase field Model with special Heat Flux laws and Memory effects*, Asymptot. Anal., **36** (2003), 285–301.
6. E. ROCCA: *The Conserved Penrose-Fife System with Temperature-dependent Memory*, J. Math. Anal. Appl., **287** (2003), 177–199.
7. E. ROCCA: *Existence and uniqueness for the parabolic conserved phase field model with memory*, Commun. Appl. Anal., **8** (2004), 27–46.
8. P. COLLI, G. GILARDI, E. ROCCA, G. SCHIMPERNA: *On a Penrose-Fife phase-field model with non-homogeneous Neumann boundary condition for the temperature*, Differential Integral Equations, **17** (2004), 511–534.
9. E. ROCCA, G. SCHIMPERNA: *Universal attractor for some singular phase transition systems*, Physica D, **192** (2004), 279–307.

10. E. ROCCA, G. SCHIMPERNA: *Universal attractor for a Penrose-Fife system with special heat flux law*, *Mediterr. J. Math.*, **1** (2004), 109–121.
11. E. ROCCA: *Well-posedness and regularity for a parabolic-hyperbolic Penrose-Fife phase field system*, *Appl. Math.*, **50** (2005), 415–450.
12. A. LORENZI, E. ROCCA, G. SCHIMPERNA: *Direct and inverse problems for parabolic integro-differential systems of Caginalp type*, *Adv. Math. Sci. Appl.*, **15** (2005), 227–263.
13. M. FRÉMOND, E. ROCCA: *Well-posedness of a phase transition model with the possibility of voids*, *Math. Models Methods Appl. Sci.*, **16** (2006), 559–586.
14. E. ROCCA, G. SCHIMPERNA: *Global attractor for a parabolic-hyperbolic Penrose-Fife phase field system*, *Discrete Contin. Dyn. Syst.*, **15** (2006), 1192–1214.
15. P. COLLI, M. FRÉMOND, E. ROCCA, K. SHIRAKAWA: *Attractors for the 3D Frémond model of shape memory alloys*, *Chin. Ann. Math. Ser. B*, **27** (2006), 683–700.
16. G. GILARDI, E. ROCCA: *Convergence of phase field to phase relaxation governed by the entropy balance with memory*, *Math. Meth. Appl. Sci.*, **29** (2006), 2149–2179.
17. P. KREJČÍ, E. ROCCA, J. SPREKELS: *Nonlocal temperature-dependent phase-field models for non-isothermal phase transitions*, *J. London Math. Soc.*, **76** (2007), 197–210.
18. E. BONETTI, E. ROCCA: *Global existence and long-time behaviour for a singular integro-differential phase-field system*, *Commun. Pure Appl. Anal.*, **6** (2007), 367–387.
19. A. LORENZI, E. ROCCA: *Weak solutions for the fully hyperbolic phase-field system of conserved type*, *J. Evol. Equ.*, **7** (2007), 59–78.
20. P. KREJČÍ, E. ROCCA, J. SPREKELS: *Nonlocal phase-field models for non-isothermal phase transitions with non-constant specific heat*, *Interfaces Free Bound.*, **9** (2007), 285–306.
21. G. GILARDI, E. ROCCA: *Well posedness and long time behaviour for a singular phase field system of conserved type*, *IMA J. Appl. Math.*, **72** (2007), 498–530.
22. E. BONETTI, M. FRÉMOND, E. ROCCA: *A new dual approach for a class of phase transitions with memory: existence and long-time behaviour of solutions*, *J. Math. Pure Appl.*, **88** (2007), 455–481.
23. P. COLLI, P. KREJČÍ, E. ROCCA, J. SPREKELS: *Nonlinear evolution inclusions arising from phase change models*, *Czech. Math. J.*, **57** (2007), 1067–1098.
24. A. LORENZI, E. ROCCA: *Identification of two memory kernels in a fully hyperbolic phase-field system*, *J. Inverse Ill-Posed Probl.*, **16** (2008), 147–174.
25. E. ROCCA, R. ROSSI: *Analysis of a nonlinear degenerating PDE system for phase transitions in thermoviscoelastic materials*, *J. Differential Equations*, **245** (2008), 332–3375.

26. E. ROCCA, R. ROSSI: *Global existence of strong solutions to the one-dimensional full model for phase transitions in thermoviscoelastic materials*, Appl. Math., **53** (2008), 485–520.
27. M. FRÉMOND, E. ROCCA: *Solid liquid phase changes with different densities*, Quart. Appl. Math., **66** (2008), 609–632.
28. E. FEIREISL, H. PETZELTOVÀ, E. ROCCA: *Existence of solutions to some models of phase changes with microscopic movements*, Math. Meth. Appl. Sci., **32** (2009), 1345–1369.
29. P. KREJČÍ, E. ROCCA, J. SPREKELS: *A bottle in a freezer*, SIAM J. Math. Anal., **41** (2009), 1851–1873.
30. E. FEIREISL, H. PETZELTOVÀ, E. ROCCA, G. SCHIMPERNA: *Analysis of a phase-field model for two-phase compressible fluids*, Math. Models Methods Appl. Sci., **20** (2010), 1129–1160.
31. M. FRÉMOND, E. ROCCA: *A model for shape memory alloys with the possibility of voids*, Discrete Contin. Dyn. Syst., **27** (2010), 1633–1659.
32. P. KREJČÍ, E. ROCCA, J. SPREKELS: *Phase separation in a gravity field*, Discrete Contin. Dyn. Syst. Ser. S, **4** (2011), 391–407.
33. E. FEIREISL, E. ROCCA, G. SCHIMPERNA: *On a non-isothermal model for nematic liquid crystals*, Nonlinearity, **24** (2011), 243–257.
34. P. COLLI, P. KREJČÍ, E. ROCCA, J. SPREKELS: *A nonlocal quasilinear multi-phase system with nonconstant specific heat and heat conductivity*, J. Differential Equations, **251** (2011), 1354–1387.
35. D. HÖMBERG, E. ROCCA: *A model for resistance welding including phase transitions and Joule heating*, Math. Meth. Appl. Sci., **34** (2011), 2077–2088.
36. H. PETZELTOVÁ, E. ROCCA, G. SCHIMPERNA: *On the long-time behavior of some mathematical models for nematic liquid crystals*, Calc. Var. Partial Differential Equations, **46** (2013), 623–639.
37. E. FEIREISL, M. FRÉMOND, E. ROCCA, G. SCHIMPERNA: *A new approach to non-isothermal models for nematic liquid crystals*, Arch. Ration. Mech. Anal., **205** (2012), 651–672.
38. C. CAVATERRA, E. ROCCA: *On a 3D isothermal model for nematic liquid crystals accounting for stretching terms*, Z. Angew. Math. Phys., **64** (2013), 69–82.
39. P. KREJČÍ, E. ROCCA: *Well-posedness of an extended model for water-ice phase transitions*, Discrete Contin. Dyn. Syst. Ser. S, **6** (2013), 439–460.
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- N. E. ROCCA: *“Entropic” solutions for two-phase fluids flows, phase transitions, and damage*, ISIMM – The International Society for the Interaction of Mechanics and Mathematics – FORUM, March 2015.

#### GRADUATE TEACHING

1. 2016-2017: Responsible of the course: Advanced Mathematical Methods for Engineering, Advanced Course in English for the CdL in Electronical Engineering, University of Pavia.



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