

Curriculum Elena Bonetti

PERSONAL INFORMATION

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Date of birth: April 12th 1974, in Asola (MN) - Italy

Nationality: Italian

URL for web site: <http://www.mat.unimi.it/users/bonetti/index.html>

EDUCATION

- 01/2002: PhD in Mathematics, University of Milan, advisor prof. Pierluigi Colli, thesis "Global solvability of a dissipative Fremond model for shape memory alloys"
- 2001: Degree of "Scuola Avanzata di Formazione Integrata", IUSS (Scuola Superiore di Pavia), as a student of Collegio Ghislieri
- 1997: Master graduation (cum laude) in Mathematics (University of Pavia), advisor prof. Gianni Gilardi.

CURRENT POSITION(S)

- 03/2016 – to date: Associate Professor in the Department of Mathematics, University of Milan, Italy.
- From 12/2013: Habilitation to the full professor position.

PREVIOUS POSITION(S)

- 04/2011 – 02/2016: Associate Professor in the Department of Mathematics, University of Pavia, Italy.
- 01/2001 – 03/2011: Assistant Professor in the Department of Mathematics, University of Pavia, Italy.

FELLOSHIP/AWARDS

- 2004 – to date: Research Fellow in Istituto di Matematica Applicata e Tecnologie Informatiche "Enrico Magenes" of CNR, Pavia.
- 2008: Visiting Professor in Ecole Normale Superieure de Cachan (for 1 month).
- 2001 – 2005: Funding of the European project TMR "Phase transitions in crystalline solids" for collaborations with the University of Besancon and the Laboratoire Central des Ponts et Chaussees in Paris (in 2001 and 2002 – 2003) and of EGIDE (in 2004 and 2005).

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

- Professor in the PhD Program "Computational Mechanics and Advanced Materials" of the University of Pavia and IUSS, with a specific role for daily supervision concerning analytical modeling of shape memory alloys.
- Professor in the PhD Program "Civil engineering and architectural" of the University of Pavia, with a specific role for daily supervision concerning analytical modeling of shape memory alloys.
- Professor in the PhD Program in Mathematics of the University of Milan.
- Advisor for 3 master degrees theses in the Faculty of Engineering of the University of Pavia and one master thesis in Mathematics in the University of Milan.

TEACHING ACTIVITIES

- 1998 – 2015 teaching activity in courses of calculus I & II, mathematical analysis and modeling for the Engineering Faculty of the University of Pavia.
- 2015 – to date teaching activity in courses of calculus, mathematical analysis, and evolution equations in the Faculty of Science of the University of Milan.
- Members of the PhD Committee in Civil Engineering of the University of Pavia and in Mathematics in the University of Milan

INSTITUTIONAL RESPONSIBILITIES

- Member of the directorial committee of the Engineering Faculty of the University of Pavia (2012 – 2015).

RESEARCH EXPEDITIONS

My research focuses on analytical investigation of dissipative initial and boundary value problems for PDE, arising from engineering applications in thermo-mechanics and materials science, like shape memory materials, phase transitions and phase separations phenomena, hydrogen storage, damage and fatigue of elastic and thermo-viscoelastic materials, contact with adhesion and friction, collisions and fractures, smooth and non-smooth continuum mechanics problems, plasticity, large deformations, conservation of monumental stones.

I am interested in: derivation and investigation of thermo-dynamically consistent models after introducing suitable variational settings; proof of existence, uniqueness, continuous dependence on data, regularity for the corresponding solutions; long-time behavior; asymptotic analysis for some physical parameter tending to zero. I have been involved in multi-disciplinary tasks including mathematics, mechanics, and engineering aspects.

Indeed, I have developed a clear attitude to perform modeling of non-smooth mechanical problems by using refined instruments of mathematical analysis, and in particular the theory of dissipative PDE systems. In addition, my national and international connections with experts in various fields of analysis, and applied research centers for advanced materials are an essential ingredient for the achievement of the project goals. I can manage multi-disciplinary tasks involving skills from mathematics, mechanics, and engineering applications, due to my consolidated experience in dealing with complex multi-disciplinary problems. I usually collaborate with scientists expert in different disciplines (including numerical analysis and mechanics), as shown by the list of my collaborations and publications. I have developed important joint research with national and international centers.

PUBLICATIONS

H-index (Scopus source, September 2018): 15

Citations (Scopus source, September 2018): 614

- [1] Bonetti E., Some asymptotic analysis for hyperbolic relaxed Stefan problems with memory, *Asymptotic Anal.*, 20 (1999), 241-261
- [2] Bonetti E., Global solution to a Frémond model for shape memory alloys with thermal memory, *Nonlinear Anal.*, 46 (2001), 535-565
- [3] Bonetti E., Asymptotic analysis of a diffusive model for shape memory alloys with Cattaneo-Maxwell heat flux law, *Differential Integral Equations*, 15 (2002) 527-566
- [4] Bonetti E., Global solution to a nonlinear phase transition model with dissipation, *Adv. Math. Sci. Appl.*, 12 (2002) 355-376
- [5] Bonetti E., Some results on the well-posedness of an integro-differential Frémond model for shape memory alloys, *Rend. Sem. Mat. Univ. Pol. Torino*, 6 (2002) 115-128
- [6] Bonetti E., Colli P., Dreyer W., Gilardi G., Schimperna G., Sprekels J., On a model for phase separation in binary alloys driven by mechanical effects, *Physica D: Nonlinear Phenomena*, 165 (2002) 48-65
- [7] Bonetti E., Global solvability of a dissipative Frémond model for shape memory alloys. Part I: mathematical formulation and uniqueness, *Quart. Appl. Math.*, 61 (2003), 759-781
- [8] Bonetti E., Bonfanti G., Existence and uniqueness of the solution to a 3D thermoviscoelastic system, *Electron. J. Diff. Eqns.*, 50 (2003), 1-15.
- [9] Bonetti E., Colli P., Frémond M., A phase field model with thermal memory governed by the entropy balance, *M3AS Math. Models Methods Appl. Sci.*, 13 (2003), 1565-1588
- [10] Bonetti E., Dreyer W., Schimperna G., Global solution to a generalized Chan-Hilliard equation with viscosity, *Adv. Differential Equations*, 8 (2003) 231-256
- [11] Bonetti E., Frémond M., A phase transition model with the entropy balance, *Math. Meth. Appl. Sci.*, 26 (2003) 539-556
- [12] Bonetti E., Frémond M., Damage theory: microscopic effects of vanishing macroscopic motions, *Comput. Appl. Math.*, 22 (2003) 313-333
- [13] Bonetti E., Global solvability of a dissipative Frémond model for shape memory alloys, Part II: existence, *Quart. Appl. Math.*, 62 (2004), 53-76
- [14] Bonetti E., Frémond M., Collisions and fracture: a 1D theory. How to tear off a chandelier from the ceiling, *J. Elasticity*, 74 (2004) 47-66
- [15] Bonetti E., Frémond M., Collisions and fractures: a model in SBD, *Rend. Mat. Acc. Lincei*, s. 9, 15 (2004) 47-57
- [16] Bonetti E., Frémond M., Collisions and fracture, *Vietnam J. Math.*, 32 (2004), special issue, 167-186

- [17] Bonetti E., Schimperna G., Local existence for Frémond's model of damage in elastic materials, *Contin. Mech. Thermodyn.*, 16 (2004), 319-335
- [18] Bonetti E., A new approach to phase transitions via the entropy balance, in: "Mathematical Methods and Models in Phase Transitions", A. Miranville, ed., Nova Science Publishers, Inc., NewYork 2005, pp. 125-156
- [19] Bonetti E., Bonfanti G., Asymptotic analysis for vanishing acceleration in a thermoviscoelastic system, *Abstr. Appl. Anal.*, 2 (2005) 105-120
- [20] Bonetti E., Colli P., Frémond M., Entropy balance versus energy balance - Application to the heat equation and to phase transitions, in: "Mechanical Modelling and Computational Issues in Civil Engineering", M. Frémond and F. Maceri eds, Lect. Notes Appl. Comput. Mech. 23, Springer-Verlag, Berlin 2005, pp. 379-388
- [21] Bonetti E., Frémond M., A damage model: microscopic effects of macroscopic deformations, in: "Mechanical Modelling and Computational Issues in Civil Engineering", M. Frémond and F. Maceri eds, Lect. Notes Appl. Comput. Mech. 23, SpringerVerlag Berlin, 2005
- [22] Bonetti E., Schimperna G., Segatti A., On a doubly nonlinear model for the evolution of damaging in viscoelastic materials, *J. Differential Equations*, 218 (2005) 91-116
- [23] Bonetti E., Modelling phase transitions via the entropy balance: long-time behaviour of the solutions, in: "Dissipative phase transitions", P. Colli, N. Kenmochi, J. Sprekels eds, Series on "Advances in Mathematics for Applied Sciences" 71 World Sci. Publishing 2006, pp. 21-42
- [24] Bonetti E., Colli P, Fabrizio M., Gilardi G., Modelling and long-time behaviour for phase transitions with entropy balance and thermal memory conductivity, *Discrete Contin. Dyn. Syst. Ser. B*, 6 (2006) 1001-1026
- [25] Bonetti E., Frémond M., L'excellent Ch., Global existence and uniqueness for a thermomechanical model for shape memory alloys with partition of the strain, *Mathematics and Mechanics of solids*, 11 (2006) 251-275
- [26] Bonetti E., Bonfanti G., Rossi R., Well-posedness and long-time behaviour for a model of contact with adhesion, *Indiana Univ. Math. J.*, 56 (2007) 2787-2820
- [27] Bonetti E., Colli P., Fabrizio M., Gilardi G., Global solution to a singular integrodifferential system related to the entropy balance, *Nonlinear Anal. TMA*, 66 (2007) 1949-1979
- [28] Bonetti E., Frémond M., L'excellent Ch., Hydrogen storage: modelling and analytical results, *Appl. Math. Optim.*, 55 (2007) 31-59
- [29] Bonetti E., Frémond M., Rocca E., A new dual approach for a class of phase transitions with memory: existence and long-time behaviour of solutions, *J. Math. Pures Appl.*, 88 (2007) 455-481
- [30] Bonetti E., Rocca E., Global existence and long-time behaviour for a singular integrodifferential phase-field system, *Commun. Pure Appl. Anal.*, 6 (2007) 367-389
- [31] Bonetti E., Bonfanti G., Well-posedness results for a model of damage in thermoviscoelastic materials, *Ann. I. H. Poincaré AN*, 25 (2008) 1187-1208
- [32] Bonetti E., Bonfanti G., Rossi R., Global existence for a contact problem with adhesion, *Math. Meth. Appl. Sci.*, 31 (2008) 1029-1064
- [33] Bonetti E., Bonfanti G., Rossi R., Thermal effects in adhesive contact: modelling and analysis, *Nonlinearity*, 22 (2009) 2967-2731
- [34] Bonetti E., Colli P., Fabrizio M., Gilardi G., Existence and boundedness of solutions for a singular phase field system, *J. Differential Equations*, 246 (2009) 3260-3295
- [35] Auricchio F., Bonetti E., Marigonda A., A metric approach to plasticity via HamiltonJacobi equation, *M3AS Math. Models Methods Appl. Sci.*, 20 (2010), 1-31
- [36] Bonetti E., Frémond M., Analytical results on a model for damaging in domains and interfaces, *ESAIM Control Optim. Calc. Var.*, 17 (2011), 955-974
- [37] Bonetti E., Bonfanti G., Rossi R., Long time behavior of a thermomechanical model for adhesive contact, *Discrete and Continuous Dynamical Systems. Series S*, 4 (2011), 273-309
- [38] Bonetti E., Fabrizio M., Frémond M., A first order phase transition with non constant density, *Journal of Mathematical Analysis and Applications*, 384 (2011), 561-577
- [39] Bonetti E., Bonfanti G., Rossi R., Analysis of a unilateral contact problem taking into account adhesion and friction, *J. Differential Equations*, 235 (2012), 438-462
- [40] Bonetti E., Colli P., Laurencot Ph., Global existence for a hydrogen storage model with full energy balance, *Nonlinear Anal.*, 75 (2012), 3558-3573

- [41] Auricchio F., Bonetti E., A new flexible 3D macroscopic model for shape memory alloys describing martensite reorientation, *Discrete Contin. Dyn. Syst. Ser. S*, 6 (2013), 277-291
- [42] Bonetti E., Colli P., Frémond M., The motion of a solid with large deformations, *Comptes rendus mathématiques*, 351 (2013), 579-583
- [43] Bonetti E., Colli P., Frémond M., The 3D motion of a solid with large deformations, *Comptes rendus mathématiques*, 352 (2014), 183-187
- [44] Bonetti E., Frémond M., A phase transition model for the helium supercooling, *Asymptotic Anal.*, 87 (2014), 29-42
- [45] Bonetti E., Colli P., Gilardi G., Singular limit of an integrodifferential system related to the entropy balance, *Discrete Contin. Dyn. Syst. ser. B*, 19 (2014), 1935-1953
- [46] Auricchio F., Bonetti E., Scalet G., Ubertini F., Theoretical and numerical modeling of shape memory alloys accounting for multiphase transformations and martensite reorientation, *International Journal of Plasticity*, 59 (2014), 30-54
- [47] Bonetti E., Bonfanti G., Rossi R., Analysis of a temperature-dependent model for adhesive contact with friction, *Physica D*, 285 (2014), 29-42
- [48] Bonetti E., Colli P., Frémond M., 2D motion of with large deformations, *Bollettino dell'Unione Matematica Italiana*, 7 (2014), 19-44
- [49] Bonetti E., Bonfanti G., Rossi R., Analysis of a model coupling volume and surface processes in thermoviscoelasticity, *Discrete Contin. Dyn. Syst. ser. A*, 35 (2015), 2349-2403
- [50] Bonetti E., Bonfanti G., Rossi R., Modeling via internal energy balance and analysis of adhesive contact with friction in thermoviscoelasticity, *Nonlin. Anal. RWA* 22 (2015), 473-50
- [51] Scalet G., Auricchio F., Bonetti E., Castellani L., Ferri D., Pachera M., Scavello F., An experimental, theoretical and numerical investigation of shape memory polymers, *International Journal of Plasticity*, 67 (2015), 127-147
- [52] Bonetti E., Heinemann Ch., Kraus Ch., Segatti S., Modeling and analysis of a phase field system for damage and phase separation processes in solids, *J. Differential Equations*, 258 (2015), 3928-3959
- [53] Bonetti E., Colli P., Fabrizio M, Gilardi G., Existence of solutions for a mathematical model related to solid-solid phase transitions in shape memory alloys, *Arch. Ration. Mech. Anal.*, 219 (2016), 203-254
- [54] Bonetti E., Rocca E., Rossi R., Thomas M., A rate-independent gradient system in damage coupled with plasticity via structured strains, *ESAIM Proc. Surveys*, 54 (2016), 54-69
- [55] Bonetti E., Freddi F., Segatti A., An existence result for complete damage in elastic materials, *Contin. Mech. Thermodyn., Continuum Mechanics and Thermodynamics* 29 (2017), 31-50
- [56] Bonetti E., Rocca E., Unified gradient flow structure of phase field systems via a generalized principle of virtual powers, *ESAIM - Control, Optimisation and Calculus of Variations*, 23 (2017), 1201-1216
- [57] Bonetti E., Bonfanti G., Lebon F., Rizzoni R., A model of imperfect interface with damage, *Meccanica*, *Meccanica*, 52 (2017), 1911-1922
- [58] Bonetti E., Colli P., Tomassetti G., A non-smooth regularization of a forward-backward parabolic equation, *Mathematical Models and Methods in Applied Sciences* 27 (2017), 641-661
- [59] Bonetti, Elena; Fabrizio, Mauro; Frémond, Michel A phase transition model describing auxetic materials. *Solvability, regularity, and optimal control of boundary value problems for PDEs*, 77–95, Springer INdAM Ser., 22, Springer, Cham, 2017.
- [60] Bonetti, Elena; Rocca, Elisabetta; Scala, Riccardo; Schimperna, Giulio On the strongly damped wave equation with constraint. *Comm. Partial Differential Equations* 42 (2017), no. 7, 1042–1064.
- [61] Bazuet, C.; Bonetti, E.; Bonfanti, G.; Lebon, F.; Vallet, G. A global existence and uniqueness result for a stochastic Allen-Cahn equation with constraint. *Math. Methods Appl. Sci.* 40 (2017), no. 14, 5241–5261.
- [62] Bonetti, Elena; Frémond, Michel; Motion of an incompressible solid with large deformations. *C. R. Math. Acad. Sci. Paris* 356 (2018), no. 3, 345–350.
- [63] Bonetti E., Colli P., Scarpa L., Tomassetti G., A doubly nonlinear Cahn-Hilliard system with nonlinear viscosity, *Communications on pure and applied analysis*, (2018), no. 17, 1001–1022
- [64] Bonetti E., Bonfanti G., Rossi R., Global existence for a nonlocal model for adhesive contact, *Applicable Analysis*, (2018), no. 8, 1315–1339

- [65] Bonetti E., Cavaterra C., Grasselli M., Freddi F., Natalini R., A nonlinear model for marble sulphation including surface rugosity: theoretical and numerical results, *Comm. Pure Appl. Anal.*, to appear (2018)
- [66] Bonetti E., Bonfanti G., Lebon F., Derivation of imperfect interface models coupling damage and temperature, *Computers and Mathematics with Applications*, to appear (2018)

I have 32 co-authors, in the papers in which the co-authors are only scientists expert in engineering and mechanical sciences, I have been responsible for the whole analytical investigation and the modeling aspects.

MAJOR COLLABORATIONS

I have developed joint research projects, leading to several publications, with the following Universities and Institutions: Laboratoire Central des Ponts et Chaussées and Ecole Nationale Supérieure des Techniques Avancées (Paris); WIAS-Weierstrass Institute for Applied Analysis and Stochastics (Berlin); Laboratoire de Mécanique et d'Acoustique-CNRS (Marseille); Univ. di Brescia; Univ. Pavia, Univ. Bologna; Univ. Tor Vergata, Univ. Parma; Ecole Nationale des Ponts et Chaussées (Paris), Laboratoire de Mécanique Civil (Montpellier), Laboratoire de Mécanique Appliquée (Besançon); Basic Chemicals and Plastic Research Center Versalis, ENI; IAC-CNR (Roma).

INVITED PRESENTATIONS TO INTERNATIONAL CONFERENCES

- 11 invited seminars at other Department (worldwide).
- 58 contributed talks at international conferences. Among the others, let me recall: (1) Unilateral problems in structural analysis (Siracusa, 2007), (2) BIRS Workshop Rate-independent systems: Modeling, Analysis, Computations (Banff, 2010), (3) ERC Workshop "Variational Views in Mechanics and Materials" (Pavia, 2013), (4) Multi-Physics Modeling of Solids (MPMS) International Colloquium 2014 (Paris, 2014), (5) ESMC 2015 - European Solid Mechanics Conference (Madrid, 2015), (6) Scientific Research for Cultural Heritage (NYU-Abu Dhabi, 2017). Then, I mention that I have been an invited plenary speaker to the XIV International conference of Free Boundary Problems (Shanghai, 2017).

PRIZES/AWARDS/ACADEMY MEMBERSHIPS

- Best "curriculum studiorum" for graduated students in the Faculty of Sciences in the University of Pavia in 1997.
- Prize "Berzolari" for the best thesis in Mathematics of the University of Pavia in the period 1993 – 1997.
- Member of Italian scientific societies Unione Matematica Italiana, Società Matematica Italiana Applicata all'Industria, Istituto di Alta Matematica, AIMETA and international scientific societies The International Society for the Interaction of Mechanics and Mathematics, Laboratoire Lagrange.

COMMISSIONS OF TRUST

Referee for international reviews (with an average frequency of 4 reports per year): *Asymptotic Analysis*; *Control and Cybernetics*; *Discrete and Continuous Dynamical Systems. Series B and S*; *M2AS Mathematical Methods in the Applied Sciences*; *M3AS Mathematical Models and Methods in Applied Sciences*; *Journal of Differential Equations*; *Journal of Elasticity*; *Journal of Mathematical Analysis and Applications*; *M2AN Mathematical Modeling and Numerical Analysis*; *SIAM Journal on Mathematical Analysis*; *Annals of Solid and Structural Mechanics*; *Journal of Analysis and its Applications - ZAA*.

Editor of a special issue dedicated to Michel Frémond on the occasion of his 70th birthday, *Discrete Contin. Dyn. Syst. Ser. S*, vol. 6 (2103).

ORGANIZATION OF SCIENTIFIC MEETINGS

Member of the organizing and scientific committee of international workshops or symposia in international conferences. Among the others, I recall

- "Dissipative models in phase transitions" (Cortona, 2004),
- "INDI2011-Interfaces and discontinuities in Solids, Liquids and Crystals" (Gargnano, 2011),
- "ADMAT2012-PDE for multiphase advanced materials" (Cortona, 2012),
- "Special Materials in Complex Systems-SMaCS 2015" (Roma, 2015), "Special Materials in Complex Systems-SMaCS 2018" (Gargnano, 2018)

CAREER BREAKS

May 20th 2005 – October 20th 2005: maternity leave.

May 24th 2009 – October 24th 2009: maternity leave.