europass Curriculum vitae

PERSONAL INFORMATION

Giovanni Bellettini

WORK EXPERIENCE

February 2017 – Present
Full Professor of Mathematical Analysis
University of Siena, Dipartimento di Ingegneria dell'Informazione e Scienze Matematiche, Università degli Studi di Siena, via Roma 56, 53100 Siena, Italy. E-mail: giovanni.bellettini@unisi.it

November 2001 – January 2017
Full Professor of Mathematical Analysis
Università degli Studi di Roma "Tor Vergata", Roma, Italy

November 1998 – October 2001
Associate Professor of Mathematical Analysis
Università degli Studi di Roma "Tor Vergata", Roma, Italy

November 1994 – October 1998
Researcher of Mathematical Analysis
Università degli Studi di Pisa, Italy

July 1991 – October 1994
Researcher of Mathematical Analysis
Università degli Studi di Bologna, Italy

2011 –
ICTP consultant of Mathematical Analysis

2010 –
INFN-LNF associate

2017 –
Member of the collegio dei docenti of the PhD school in Information Engineering and Science, Univ. of Siena

1999 –
Scientific secretary for Ann. Sc. Norm. Sup. Pisa Cl. Sci.

EDUCATION AND TRAINING

November 1989–October 1993
Ph.D. in Functional Analysis and Applications
SISSA-ISAS, International School for Advanced Studies, Trieste

Thesis: "Geometric problems involving curvatures in the Calculus of Variations"

Supervisor: Gianni Dal Maso

November 1982–November 1988
Degree in Mathematics
Università di Pisa, Pisa, Italy

Thesis: "Problemi di tipo geometrico nel Calcolo delle Variazioni". Grade: 110/110 cum laude

Advisor: Luciano Modica

1986
Maturità Scientifica (60/60)
Liceo Scientifico "Ulisse Dini", Pisa, Italy

PERSONAL SKILLS

Mother tongue: Italian

Other languages: English (fluent), French (basic), Espanish (beginner), German (beginner).

Programming Languages
- Basic programming skills in LaTeX.
- Rudimental programming skills in C.

TEACHING EXPERIENCE

Teaching activity:

- 1998-2017: lecturer of the course Analysis I (90 hours approximately), or Analysis II (90 hours approximately) for Engineering students, each year, at the University of Roma "Tor Vergata". Participation to all exam sessions (6 per year).
- 2017-: lecturer of the course Analysis I (90 hours) for Mathematics, Physics, and Engineering students, each year, at the University of Siena. Participation to all exam sessions (6 per year).
- 2017-: lecturer of the course Advanced Analysis (48 hours) for Mathematics students, each year, at the Master Degree in Applied Mathematics, at the University of Siena. Participation to all exam sessions (6 per year).

Advanced minicourses:

- *Some aspects of motion by mean curvature I, II, III, IV*, Crete (Greece), 1998.
- *Geometric Evolution Problems*, Minicorsi di Analisi Matematica, Padova 2003.
- *Anisotropic and crystalline mean curvature flow*, Rome 2004.
- *Variational principles for geometric evolutions I, II*, KTH, Stockholm (Sweden), 2007.
- *An introduction to mean curvature flow I, II, III, IV*, University of Castilla La Mancha (Spain), 2008.
- *An introduction to mean curvature flow*, University of Trieste (Italy), 2009.
- *Soluzioni deboli del flusso per curvatura media: barriere minime*, SISSA (Trieste), Italy, 2009.
- *An introduction to mean curvature flow I, II, III, IV*, Centro De Giorgi, Scuola Normale Superiore di Pisa, Pisa 2009.
- *An introduction to anisotropic and crystalline mean curvature flow I, II, III, IV: tutorial course*, Hokkaido University, Hokkaido, Sapporo (Japan), 2010.
- *Mean curvature flow and singular perturbations* I, II, III, in Winter School on "Geometric Evolution Equations and Related Topics", Regensburg, October 8-10, 2012.

Ph.D. courses:

- *Geometric evolutions of manifolds, motion by mean curvature*, Pisa 1998.
- *Partial Differential Equations*, Rome 1999.
- *Calculus of Variation in one dimension: classical theory*, Rome 2000.
- *Motion by mean curvature*, Rome 2000.
- *Geometric Measure Theory*, Rome 2001.
- *Calculus of Variations*, Rome 2002.
- *Minimizing movements*, Rome 2003.
- *Una introduzione alle equazioni differenziali*, INDAM, Rome 2005.
- *Anisotropic evolution problems*, Rome 2006.
- *Mean curvature flow and singular perturbations*, SISSA (Trieste), 2012.
- *Variational models depending on curvatures in image reconstruction*, SISSA (Trieste), 2013.
- *Anisotropic and crystalline mean curvature flow*, SISSA (Trieste), 2014.
- *The Plateau problem and related questions*, SISSA (Trieste), 2015.
- *The Plateau problem and related questions*, SISSA (Trieste), 2016.
- *Some results on Plateau's type problem*, SISSA (Trieste), 2017.
- *An Introduction to Functional Analysis*, Dip. di Ingegneria dell'Informazione e Scienze Matematiche, Siena, 2017.
- *The Plateau problem and related questions*, SISSA (Trieste), 2018.
- *An Introduction to Partial Differential Equations*, Dip. di Ingegneria dell'Informazione e Scienze Matematiche, Siena, 2018.
- *Some aspects of mean curvature flow*, SISSA (Trieste), 2019.
- *Some aspects of mean curvature flow*, SISSA (Trieste), 2021.
- *Some aspects of mean curvature flow*, SISSA (Trieste), 2023.
- *Some aspects of mean curvature flow and minimal surfaces*, SISSA (Trieste), 2024.

Diploma courses at ICTP:

Functional Analysis and/or Partial Differential Equations: 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024.

SUPERVISING ACTIVITY

Supervision of Bachelor degree students

- Rossi R.: *A variational model for cracking in one-dimensional elasticity* (Univ. Roma "Tor Vergata" 2004).
- Doronzo M.: *Applications of Feynman-Kac formulas* (Univ. Roma "Tor Vergata" 2005).
- Palandra A.: *Probability and finance* (Univ. Roma "Tor Vergata" 2006).
- Biasutto S.A.: *Some economics applications of Calculus if Variations in one dimension* (Univ. Roma "Tor Vergata" 2007).
- Gagliardi, D.: *Equazioni di Hamilton-Jacobi e applicazioni* (Univ. Roma "Tor Vergata" 2008).
- De Angelis, F: *Un approccio variazionale per l'evoluzione di fratture* (Univ. Roma "Tor Vergata" 2017).
- N. Mazur: *Sulla chiusura debole di alcuni spazi di funzionali su funzioni continue tramite delte di Dirac* (Univ. Siena 2019).

Supervision of Master degree students

- Masala M.: *Sulla funzione distanza al quadrato da una varietà* (Univ. Roma "Tor Vergata" 2004).
- Caselli F.: *Γ-convergence and the least squares method: applications to differential equations* (Univ. Roma "Tor Vergata" 2008).
- V. Galeotti: *Studio del rilassato di alcuni funzionali dipendenti dalla curvatura del bordo di sottoinsiemi del piano* (Univ. Siena 2021).
- V. Lorenzini: *Equazioni ellittiche* (Univ. Siena 2021).
- R. Yammine, *Curve shortening flow* (Univ. Siena 2022).

Degree students in collaboration with INFN-LNF:

Bosco A. (2005), Senatore M. (2007), Paoli D. (2007), Gentile, S. (2008), Palandra, L. (2013), Piergentili, F. (2013), Marra, M. (2013), Capotorto, G. (2013).

Supervision of ICTP Diploma students

- Nguyen Thuong Ngoc Quoc: *Reaction-diffusion approximations of mean curvature flow*, 2011.
- Yaptieu Djengue O.S. : *On some properties of mean curvature flow with forcing and a pressure term*, 2011.
- Ngouanfo Fopa E.L. : *Introduction to mathematical optimal control theory*, 2012.
- Gueye Dabakh A.A. : *Some topics on ordinary differential equations in mechanics and geometry*, 2012.
- Khosravi M. : *Minimizing movements for differential equations*, 2012.
- Issa Tahir Bachar: *A recent variational approach to semilinear wave equations*, 2012.
- Batzorigh U. : *Spectrum of bounded linear operators*, 2013.
- Ngartelbaye G. : *Elliptic-type regularization for semilinear wave equations*, 2013.
- Ikromova D. : *The Dirichlet problem for Laplace and second elliptic operators: existence*, 2014.
- Alsammani A. : *The Alexander polynomial of a knot*, 2014.
- Aryam F. : *Some notes on the Navier-Stokes equations*, 2014.
- Khachatryan M. : *The Brownian motion*, 2015.
- Abdulrashid I. : *The GN Theorem*, 2015.
- Yousfi N. : *Some classical results in Calculus of Variations in dimension one*, 2016.
- Martinez Marquez R. : *Some classical results on convex functions*, 2017.
- Wahid Ullah: *Some topics on C^*-algebras*, 2018.
- Nguyen Anh Hung: *Knots and graphs,* 2018.
- Alain Didier Noutchegueme, *Disk-type minimal surfaces: the Plateau problem and another proof of the Riemann mapping theorem,* 2020.
- Toshpulatov Gayrat, *Some results on regularity of elliptic partial differential equations and systems,* 2020.

Supervision of PhD students

- L. Mugnai: *Relaxation and variational approximation of curvature-dependent functionals in two dimensions*, Univ. of Pisa, 2003.
- G. Riey: *Partition energies: approximation and first variation*, Univ. of Roma "Tor Vergata", 2004.
- M. Chermisi: *Crystalline flows of planar networks and a geometric approach for systems of PDEs*, Univ. of Roma "Tor Vergata", 2006.
- C. Tornese: *Convergence of discrete schemes for the Perona-Malik equation*, Univ. of Roma "Tor Vergata", 2008.
- L. Tealdi: *The relaxed area of maps from the plane to the plane with a line discontinuity, and the role of semicartesian surface*, SISSA (Trieste), 2015.
- S. Amato: *Some results on anisotropic mean curvature and other phase transition problems for Plateau's type problem*, SISSA (Trieste), 2015.
- S. Holmatov: *Minimizing movements for mean curvature evolution of droplets and partitions*, SISSA (Trieste), 2017.
- A.A. Elshorbagy: *On the relaxed area of maps from the plane to the plane taking three values*, SISSA (Trieste), 2019.
- S. Carano: *Area functional and relaxation: an approach in dimension 2 and codimension 2 via strict BV-convergence*, SISSA (Trieste), 2023.
- Actual co-advisor of V. Lorenzini (Univ. of Siena).

COORDINATOR OF RESEARCH GROUPS AND ORGANIZING ACTIVITY

Coordinator of research groups:

- Italian coordinator of the bilateral project “Calculus of Variations: semicontinuity, relaxation, optimal design and approximation”, Italia-Spagna, 1996.

- Coordinator of the Gnampa project entitled “ Energie anisotrope, policristalline e di partizioni, e loro evoluzione secondo la massima discesa”, Rome 2003.

- Coordinator of the Gnampa project entitled “Evoluzioni di interfacce e loro regolarizzazione mediante equazioni del quarto ordine”, Rome 2004.

- Coordinator of a research group (2004 - 2015) at the Centro De Giorgi (Scuola Normale Superiore, Pisa) on the subject “Interface Evolutions”. Other components: V. Caselles (Barcellona) (up to 2013), A. Chambolle (Ecole Polytechnique, Paris), and M. Novaga (Pisa).

Organization of conferences and workshops:

- Organizer of the workshop “Variational Problems with Free Interfaces”, Pisa, 1997.

- Organizer of the workshop “Interface Evolutions and Applications”, Centro De Giorgi, Scuola Normale Superiore, Pisa, 2004.

- Organizer of the workshop “Gradient flows of nonconvex functionals and related topics”, Centro De Giorgi, Scuola Normale Superiore, Pisa, 2005.

- Organizer of the “Second School on Analysis and Applied Mathematics”, Univ. Roma La Sapienza, 2005.

- Organizer of the “One day workshop on geometric evolution problems’, Centro De Giorgi, Scuola Normale Superiore, Pisa, 2005.

- Organizer of the workshop “Recent advances on the Perona-Malik equation”, Centro De Giorgi, Scuola Normale Superiore, Pisa, 2006.

- Organizer of the workshop “Geometric Evolutions and Applications”, Centro De Giorgi, Scuola Normale Superiore, Pisa, 2006.

- Member of the Organizing Committee of the workshop on “Nonlocal and abstract parabolic equations and their applications” Bedlewo (Poland), Banach Center, Polish Academy of Science, 2007.

- Organizer of the workshop “Geometric Evolutions and Minimal Surfaces in Lorentzian Manifolds”, Centro De Giorgi, Scuola Normale Superiore, Pisa, 2010. September 7-10, 2010.

- Co-organizer of the focus session ”Singular Geometric Evolutions of Free Boundaries”, at the Free Boundary Problem 2012 Conference, june 11-15 Chiemsee, Germany.

- Co-director of the School on Extrinsic mean curvature flow, ICTP Trieste, June 4-15, 2018.

- Co-organizer of the minisymposium “Nonlocal minimal surfaces and related equations” Krakow September 16, Krakow, at the DEA conference 2019, Krakow.

- Co-organizer of the workshop “Incontri di Analisi Matematica tra Firenze, Pisa e Siena”, Florence May 17, 2019, Pisa November 2020, online June 4, 2021, Florence December 6, 2023.

- Co-organizer of the workshop “Free Boundary Problems and related Evolution Equations”, ESI Vienna (Austria), February 21-25, 2022.

- Co-organizer of the workshop “ Calculus of Variations in Siena”, Univ. of Siena (Italy), January 31-February 2, 2024.

VISITING PROFESSOR

University of Maryland (United States), University of Montpellier II (France), Newton Institute (University of Cambridge, United Kingdom), University of Basel (Switzerland), University of Ciudad Real (Spain), University of Toulon-Du Var (France), Max Planck Institute in the Sciences (Leipzig, Germany), Max Planck Insitute for Gravitational Physics (Golm, Germany), Hausdorff Center (University of Bonn, Germany), University Pompeu Fabra (Barcelona, Spain), Stockholm, KTH (Sweden), Newton Institute (Cambridge, UK), NYUAD Abu Dhabi, Emirates, Wien University (Austria).

EDITORIAL ACTIVITY

Associate Editor:

Interfaces and Free Boundaries (European Mathematical Society), 2013-;

Geometric Flows (De Gruyter), 2014-2020;

Rendiconti dell’Istituto di Matematica dell’Università di Trieste, 2021-.

REVIEW ACTIVITY

Referee for the following journals:

Adv. Calc. Var., Ann. Inst. H. Poincaré Anal. Non Lin., Annali Mat. Pura Appl., Annali Sc. Norm. Sup. Pisa, Arch. Ration. Mech. Anal., Atti Accad. dei Lincei, Bull. London Math. Soc., Calc. Var. Partial Differential Equations, Comm. Cont. Math., Comm. Math. Phys., Comm. Partial Differential Equations, Comm. Pure Appl. Anal., Discrete Cont. Dyn. Systems, Electronic J. Differential Equations, Esaim: Control, Opt. and Calc. Var., Interfaces Free Bound., J. Comp. Phys., J. Control, Opt. Calculus of Variations, J. Convex Anal., J. Differential Equations, J. Differential Geom., J. Evolution Equations, J. Geom. Anal., J. Reine Angew. Math., Manuscripta Math., Math. Ann., Math. Meth. Appl. Sci., Meth. Appl. Anal., Pacific J. Math., Phys. A, Rendiconti Mat. Appl., Rendiconti Univ. Padova, Revista Mat. Iberoamericana, Siam J. Imaging Sci., Siam J. Math. Anal., Transactions Amer. Math. Soc.

Member and referee of evaluating Committees

2003: referee for the Swedish Research Council.

2004: referee for the award of a Senior Fellowship of the Croucher Foundation (Hong Kong).

2007: member of a Committee for a full professorship position in Italy.

2008: referee for a Ph.D. thesis at the Univ. de Bretagne Occidentale (France).

2009: member of the Committee for the evaluation of a Ph.D. Thesis at the Lab. J. Kuntzmann, Mathématiques Appliquées-Informatique, Univ. de Grenoble (France).

2010: member of a Committee for a full professorship position in Italy.

2011: member of a Committee for an associate professorship at Georgetown University (Usa).

2011: member of a Commettee for confirmation of associate professorships in Italy.

2011: member of the Commettee for assigning the positions for the Laurea Magistrale at SISSA/ISAS (Trieste).

2011: referee for a Ph.D. Thesis at the Université Pierre et Marie Curie, Paris.

2012 Peer referee VQR for the evaluation of research programs 2004-2010.

2014: member of a Commettee for confirmation of associate professorships in Italy.

2014 External member of the Committee for the Doctoral School in Applied Mathematics at the International School for Advanced Studies SISSA-ISAS, Trieste.

2014: member of the Commettee for the Laurea Magistrale at SISSA/ISAS (Trieste).

2014: referee for a Ph.D. thesis at the Univ. de la Lorreine (France).

2015: referee for a professorship position W2 at the University of Hamburgh (Germany).

2015: referee for a PhD thesis at the University of Ulm (Germany).

2016: referee for evaluation of two research projects for FWF Der Wissenschaftfonds (Austria).

2016: member of a PhD Committee at the University of Pisa.

2016: referee for a W1 position at the University of Münster (Germany).

2017: referee for a Ph.D. thesis at the Univ. of Ulm (Germany).

2018: referee for a research proposal submitted to the National Science Centre Narodowe Centrum Nauki, Poland.

2018: evaluator for a full professorship at the National Taiwan Normal University.

2019: referee for a short-term application to the ESI (Wien).

2019: member of a PhD Committee in Pisa.

2019: member of a Committee for an RTDB position at the University of Siena.

2020: referee for a PhD thesis at the University of Regensburg (Germany).

2020: referee of a PhD thesis at the University of Pisa

2021: reviewer for a Personal Research Grant, for the Israel Science Foundation (Israel).

2021: member of a Committee for an RTDA position at the University of Verona.

2021: member of a Committee for an RTDB position at the University of Pisa.

2022: member of a Committee for an RTDB position at the University of Siena.

2022: reviewer for FWF Der Wissenschaftsfonds (Austria)

2022: reviewer for Deutsche Forschungsgemeinschaft (German Research Foundation)

2022 External member of the Committee for two PhDs defences, at the International School of Advanced Studies SISSA-ISAS, Trieste.

2023: reviewer for Deutsche Forschungsgemeinschaft (German Research Foundation)

2023: member of a Committee for the Phd defence at the International School of Advanced Studies SISSA-ISAS, Trieste.

2023: member of a PhD Committee at the Politecnico di Torino.

2016: referee for evaluation of a research project for FWF Der Wissenschaftfonds (Austria).

2024: referee and member of a PhD Committee at the University of Pisa.

2024: member of a Committee for an associate professorship position at the University of Siena (Italy).

PRINCIPAL SEMINARS GIVEN

Seminars held at universities and research centers abroad

Newton Institute, Cambridge (1995), University of Montpellier II (1996), University of Basel (1997), Institute Henry Poincarè, Centre Emile Borel, Paris (1998), Echole Polytecnique Federale de Lausanne (2003), Max Planck Institute in the Sciences, ETH Zürich (2004), Leipzig (2005), Max Planck Institute for Gravitational Physics, Golm (2006), University of Zürich (2007), University of Freiburg (2008), Hausdorff Center, University of Bonn (2008), Max Planck Institute in the Sciences, Leipzig (2010), Echole Polytechnique, Paris (2012), Dortmund TU (2014), NYUAD Abu Dhabi (2015), University of Wien, Austria (2018) , Univ. of Lisbon, WADE seminar 18 november 2021 (online) , Univ. of Athens (2021).

Seminars held at universities and research centers in Italy

University of Trento (1989, 1995, 2002, 2006), University of Milano (1993, 1997), University of Roma "Tor Vergata" (1994, 1997, 1999), University of Roma "La Sapienza" (1994, 1999, 2002, 2005, 2015 , 2019), University of Firenze (1996, 2018), University of l'Aquila (1996, 1997, 2004, 2007), Istituto per le Applicazioni del Calcolo, Roma (1999), University of Napoli (2000, 2016), University of Padova (2002), University of Bologna (2003), University of Pisa (2006), University of Trieste (2009,2020), University of Pavia (2009), University of Udine (2009), University of Brescia La Cattolica (2010, 2016), ICTP Trieste (2011, 2018, 2020), SISSA Trieste (2014), University of Bologna (2015), University of Napoli (2015), University of Trieste (2015), Collegio Fonda Trieste (2016), Bressanone, Geometric Measure Theory (2023).

CONFERENCES AND WORKSHOPS

Invited speaker at international conferences

Pont á Mousson, Metz (1991, 1994), Oberwolfach (1994, 1998, 2000, 2001, 2004(2), 2006, 2007(2), 2008, 2010, 2011 (2), 2013), (2014), (2015), (2018), Berlin (1996), Freiburg (1998), Barcellona (2000), Paris (2000), Debrecen (2003), Edinburgh (2005), Lyon (2005), Roscoff (2007), Bedlewo (2007), Zürich (2007), Hausdorff Center, Bonn (2008), Max Planck Institute, Leipzig (2008), Carnegie Mellon Univ., Pittsburgh PA, USA (2009), Poros, Greece (2009), Max Planck Institute Golm, Germay (2009), Paris XI (2010), Dortmund, Germany (2011), Tuebingen, Germany (2011), Banach Center, Warsaw, Poland (2012), Chiemsee, Germany (2012), Athens, Greece (2012), ICTP (2013), Madrid (2013), Paris (IHP, 2014), Frankfurt (2015), Univ. of Sussex (UK, 2015), KTH (Stockholm, 2016), Lyon (France, 2016) Salzburg (Austria, 2016), Freiburg (Germany, 2016), Hamburg (Germany, 2018), Krakow (Poland, 2019), ESI (Wien, Austria, 2019), Steklov Institute, Moscow (2020), SIAM Conference of Mathematical Aspects of Material Science, Bilbao, online (2021), SIAM Conference Analysis PDEs (2022).

Invited speaker at conferences in Italy

Trento (1990, 1991, 1992, 1993, 1994, 1996, 1999), Catania (1991), Padova (1992, 1995), Perugia (1993), Bologna (1994), Firenze (1994), Montecatini Terme (1995), Pavia (1996), Pisa (1996, 2002, 2019 (twice), 2021), Cortona (1997, 1998, 2000), Capri (1997), Scuola Normale Superiore, Pisa (1997, 2001, 2003, 2006(2), 2008, 2009, 2010, 2012, 2017 (Centro De Giorgi)), Isola d'Elba (1997), Roma (1999, 2000, 2003, 2006, 2010 (Indam)), Levico Terme (2000, 2003, 2004, 2006, 2008, 2009, 2011, 2013, 2018) Ischia (2000), L'Aquila (2002), Lecce (2003, 2004), SISSA, Trieste (2008), Vulcano (2012).

RESEARCH INTERESTS

- Geometric evolution equations. Mean curvature flow. Barriers, minimizing movements, higher order approximations. Anisotropic and crystalline mean curvature flow. The total variation flow and variants. Evolution of partitions. The book by G. Bellettini: Lecture Notes on Mean Curvature flow, Barriers and Singular Perturbations, *Scuola Normale Superiore, Pisa* 2013, pp. xviii-325 (see the list of publications), is an introduction to the evolution of a hypersurface by its mean curvature. The aim of the book is to give an introduction to mean curvature flow using, as much as possible, a parametrization free approach. Some relevant aspects of mean flow are described, such as the role of the signed distance function and the comparison principle, and their use in the theory of barriers. Some examples of singularities are discussed. In the last chapters, also making use of a formal asymptotic inner and outer expansion, the convergence of the parabolic Allen-Cahn's equation to mean curvature flow for sufficiently short times is proven, together with an error estimate.

- Calculus of variations. Minimal surfaces, surfaces with prescribed mean curvature and their variational and numerical approximations. Relaxation (in various topologies) of the area functional for graphs in dimension two and codimension two, and connection with the Plateau's problem. Covering spaces and Plateau's problem. Higher order problems, the elastica functional. Phase transitions and Γ-convergence. Non local functionals. Applications to Image Segmentation.

- Backward-forward parabolic equations. Gradient flows of nonconvex functionals in dimension one. The Perona-Malik equation. Weak solutions, fourth-order approximations, discretizations. The bidomain model.

- Nonlinear hyperbolic equations. Scalar conservation laws. The nonlinear wave equation of Ginzburg-Landau type. Classical relativistic strings.

- Numerical Analysis. Finite differences and finite elements approximations of parabolic partial differential equations. Discrete Γ-convergence.

- Image Segmentation and invariants of surfaces embedded in three-dimensional space. Reconstruction of three-dimensional shapes from apparent contours; topological and variational problems in computer vision. Apparent contours and their invariants. The book by G. Bellettini, V. Beorchia, M. Paolini, F. Pasquarelli, Shape Reconstruction from Apparent Contours. Theory and Algorithms, *Computational Imaging and Vision*, Springer 2015 (see the list of publications), is concerned with the problem of reconstructing a (not necessarily connected) shape starting from information on its apparent contour. Starting from a variational model concerning the depth of the objects in a picture and the problem of hidden and illusory contours, we investigate one of the central problems of computer vision: the topological and algorithmic reconstruction of a smooth three dimensional scene starting from the visible part of an apparent contour. We focus our attention on the manipulation of apparent contours using a finite set of elementary moves, corresponding to diffeomorphic deformations of three dimensional scenes. The book is intended also as a user's guide to the software code `appcontour`, written for the manipulation of apparent contours and their invariants.

- Mathematical aspects of Statistical Mechanics. Nonlocal functionals in phase transitions.

- Miscellanea. Regularization of the two-body problem, systems of PDEs, general relativity, transport equations as limits of discrete games.

BOOKS

1. G. Bellettini: Lecture Notes on Mean Curvature flow, Barriers and Singular Perturbations, *Scuola Normale Superiore, Pisa* (Nuova Serie) 12. Pisa: Edizioni della Normale. pp. xviii-325, (2013). ISBN 978-88-7642-428-1/pbk; ISBN 978-88-7642-429-8/ebook DOI 10.1007/978-88-7642-429-8

2. G. Bellettini, V. Beorchia, M. Paolini, F. Pasquarelli: Shape Reconstruction from Apparent Contours. Theory and Algorithms, *Computational Imaging and Vision, Springer-Verlag*, pp. iii-333, 2015. ISBN 978-3-662-45190-8

In preparation:

3. G. Bellettini, S. Kholmatov: Minimizing Movements for Mean Curvature Flow, De Gruyter, in preparation.

PUBLICATIONS

On Mathscinet, 24/7/2024: 134 documents, 1986 citations in 1232 documents
On Scopus, 28/7/2024: 113 documents, 2084 citations, h index 25

ARTICLES IN SCIENTIFIC JOURNALS

[1] G. Bellettini: An almost everywhere regularity result for minimal partitions, *Boll. Un. Mat. Ital. B (7)*, **4A** (1990), 57–63.

[2] G. Bellettini: A numerical approach to a minimum problem with applications in image segmentations, *Ann. Univ. Ferrara* **XXXVI** (1990), 99–111.

[3] G. Bellettini, M. Paolini, C. Verdi: Γ-convergence of discrete approximations to interfaces with prescribed mean curvature, *Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur. Rend. (9) Mat. Appl.* **1** (1990), 317–328.

[4] G. Bellettini, M. Paolini, C. Verdi: Numerical minimization of geometrical type problems related to calculus of variations, *Calcolo* **27** (1990), 251–278.

[5] S. Baldo, G. Bellettini: Γ-convergence and numerical analysis: an application to the minimal partitions problem, *Ricerche Mat.* **XL** (1991), 33–64.

[6] G. Bellettini, M. Paolini, C. Verdi: Convex approximations of functionals with curvature, *Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur. Rend. (9) Mat. Appl.* **2** (1991), 297–306.

[7] G. Bellettini, G. Dal Maso, M. Paolini: Semicontinuity and relaxation properties of a curvature depending functional in 2D, *Ann. Scuola Norm. Sup. Pisa Cl. Sci. (4)* **20** (1993), 247–297.

[8] G. Bellettini, M. Paolini: Two examples of fattening for the curvature flow with a driving force, *Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur. Rend. (9) Mat. Appl.* **5** (1994), 229–236.

[9] G. Bellettini, A. Coscia: Discrete approximation of a free discontinuity problem, *Num. Funct. An. Opt* **3,4** (1994), 202–224.

[10] G. Bellettini, M. Paolini: Convex approximations of an inhomogeneous anisotropic functional. *Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur. Rend. (9) Mat. Appl.*, **5** (1994), 177–188.

[11] G. Bellettini, A. Coscia: Approximation of a functional depending on jumps and corners, *Boll. Un. Mat. Ital. (7) B*, **(7)** (1994), 151–181.

[12] M. Amar, G. Bellettini: A notion of total variation depending on a metric with discontinuous coefficients, *Ann. Inst. H. Poincaré Anal. Non Linéaire* **11** (1994), 91–133.

[13] G. Bellettini, M. Paolini: Variational properties of an image segmentation functional depending on contours curvature, *Adv. Math. Sci. Appl.* **5** (1995), 681–715.

[14] G. Bellettini, M. Paolini: Some results on minimal barriers in the sense of De Giorgi applied to driven motion by mean curvature. *Rend. Acc. Naz. Sci. XL Mem. Mat.*, **XIX** (1995), 43–67.

[15] G. Bellettini, M. Paolini: Quasi-optimal error estimates for the mean curvature flow with a forcing term, *Differential Integral Equations* **8** (1995), 735–752.

[16] M. Amar, G. Bellettini: Approximation by Γ-convergence of a total variation with discontinuous coefficients, *Asymptotic Anal.* **10** (1995), 225–243.

[17] G. Bellettini, M. Paolini: Numerical simulations of measurements of capillary contact angles. *IMA J. Numer. Anal.* **16** (1996), 165–178.

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Submitted papers:

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Papers in preparation:

RESEARCH ANNOUNCEMENTS

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PERSONAL INTERESTS

Music: diploma of piano (Conservatorio L. Boccherini, Lucca 1988).

HOBBIES

Sport

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