Graziano Guerra – Curriculum Vitæ

September 25, 2020

Place and date of birth: Correggio (RE) ITALY, October 24, 1967

Citizenship: Italy

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Academic Employement

2012-03-01 present *Associate professor* in Mathematical Analysis, Università degli studi di Milano–Bicocca, Milan, Italy.

1998-11-01 2012-02-29 *Assistant Professor* in Mathematical Analysis, Università degli studi di Milano–Bicocca, Milan, Italy.

1995-11-06 1998-10-30 *Assistant Professor* in Mathematical Analysis, Università degli studi di Milano, Milan, Italy.

1994-04-09 1995-10-31 *Ph.D. Student*, SISSA, Trieste, Italy.

1993-01-07 1994-04-06 Military service.

1992-11-01 1993-01-06 *Ph.D. Student*, SISSA, Trieste, Italy.

2020-01-16 Qualified for the role of full professor in Mathematical Analysis.

2014-11-14 Qualified for the role of full professor in Mathematical Analysis.

2013-12-30 Qualified for the role of full professor in Mathematical Analysis.

Education

2000 **Ph.D. in Functional Analysis and Applications**, SISSA Trieste, Italy. Advisor Prof. A. Bressan.

1992 **Master degree in Physics**, Università di Milano, Milan, Italy. Advisor Prof. G.P. Brivio.

Grants

With a position of responsability

2017-02-05 2020-02-05 Local Coordinator for the national research project (PRIN2015): "Hyperbolic Systems of Conservation Laws and Fluid Dynamics: Analysis and Applications". Principal Investigator: Stefano Bianchini.

2014-03-08 2017-03-08 Local Coordinator of the second research unit of the national research project (PRIN2012): "Nonlinear Hyperbolic Partial Differential Equations, Dispersive and Transport Equations: theoretical and applicative aspects". Principal Investigator: Stefano Bianchini.

2011 Principal Investigator for the 2011 GNAMPA research project: "Non Standard applications of Conservation Laws" granted by "Istituto Nazionale di Alta Matematica – Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni".

2004 Project manager for a research project with ENI S.p.A. - Divisione GAS & POWER.

Associate researcher

2003 2020 **Many** GNAMPA research projects granted by "Istituto Nazionale di Alta Matematica – Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni".

2010 **Vigoni Project** (exchange program between Italian and German academic institutions): "Non-Local Transport Processes: Modeling, Analysis, Numerics and Optimal Control", Italian Principal Investigator Prof. R.M. Colombo, German Principal Investigator Prof. M. Herty.

1997 2009 **Five** national PRIN projects.

2002 2005 RTN European project: "HYperbolic and Kinetic Equations : Asymptotics, Numerics, Analysis" (Contract Number: HPRN-CT-2002-00282 Principal Investigator: J.N. Mauser).

1996 1998 TMR European research project: "Hyperbolic Systems of Conservation Laws" (Contract Number: HCL # ERBFMRXCT960033, Principal Investigator Prof. P. Marcati).

Organization activity

2012 Organizing committee of the international conference "Twelfth International Conference on Hyperbolic Problems: Theory, Numerics, Applications" - University of Padua, June 25 to 29, 2012.

2013 Organizing committee of the Italian conference "IperMiB2013: 15th Italian Meeting on Hyperbolic Equations" – Università di Milano–Bicocca, September 11-13, 2013.

2016 Co–Organizer of the minisymposium "Analysis and numerics for the modeling through conservation laws" inside the congress "SIMAI2016", Politecnico di Milano, September 13, 2016 to September 16, 2016.

- **Oberwolfach** Workshops, Mathematisches Forschungsinstitut Oberwolfach, Germany (2013-06-09–2013-06-15, 2016-06-19–2016-06-25, 2019-05-19–2019-05-25).

- **PSU** "Department of Mathematics, The Pennsylvania State University", USA. Collaboration with Prof. A. Bressan and Prof. W. Shen (2008-05-31–2008-06-08, 2012-03-12–2012-03-23, 2015-04-13–2015-04-17, 2016-04-04–2016-04-22, 2017-05-08–2017-05-19, 2018-07-02–2018-07-06, 2019-04-08–2019-04-19).

- **Stuttgart** University, Germany, Collaboration with V. Schleper (2013-06-17–2013-06-21).

- **RWTH** Aachen University, Germany. Collaboration with Prof. M. Herty (2010-07-18–2010-07-24, 2011-08-29–2011-09-02).

- **IMA** Summer Program: "Nonlinear Conservation Laws and Applications" – Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, USA (2009-07-13–2009-07-31).

Invited Talks

- *Balance Laws with L^∞ Unbounded Sources and Application to Junction with Discontinuous Cross Section* – Sixth meeting on Hyperbolic Conservation Laws: Recent results and Research perspectives – **Università Dell'Aquila**, L'Aquila (2008-07-17–2008-07-19).

- *Lipschitz Semigroup and Traveling Waves for an Integro–Differential Equation for Slow Erosion,* – Hyperbolic Techniques for Phase Dynamics – **Mathematisches Forschungsinstitut Oberwolfach**, Germany (2013-06-09–2013-06-15).

- *Lipschitz Semigroup and Traveling Waves for an Integro–Differential Equation for Slow Erosion* – **Universität Stuttgart**, Germany (2013-06-20).

- *A 1D Compressible-Incompressible Limit for the p–System in the non Smooth Case* – Contemporary topics in conservation laws – **Laboratoire de Mathématiques de Besançon**, Besançon, France (2015-02-09–2015-02-12).

- *A Coupling Between a non-Linear 1D Compressible-Incompressible Limit and the 1D p–System in the non Smooth Case* – Department of Mathematics, **PSU**, USA (2015-04-16).

- *Uniqueness for a non–Linear 1D Compressible to Incompressible Limit in the non Smooth Case* – Department of Mathematics, **PSU**, USA (2016-04-19).

- *Uniqueness for a non–Linear 1D Compressible to Incompressible Limit in the non Smooth Case* – "11th Meeting on Nonlinear Hyperbolic PDEs and Applications [On the occasion of the 60th birthday of Alberto Bressan]", **SISSA**, Trieste, Italy (2016-06-13–2016-06-17).

- *Uniqueness for a non–Linear 1D Compressible to Incompressible Limit in the non Smooth Case* – "Hyperbolic Techniques in Modelling, Analysis and Numerics", **Mathematisches Forschungsinstitut Oberwolfach**, Germany (2016-06-19–2016-06-25).

- *Lipschitz Semigroup and Travelling Waves for an Integro-Differential Equation for Slow Erosion* – **Interdisciplinary Centre for Mathematical and Computational Modelling**, Warsaw, Poland (2017-02-14).

- *Conservation laws with discontinuous flux: backward Euler approximations and regulated fluxes* – **Dipartimento di Matematica Tullio Levi-Civita**, Padova (2018-03-21).

- *Backward Euler Approximations for Conservation Laws with Discontinuous Fluxes* – "Macroscopic Modeling of Vehicular and Pedestrian Traffic", **Dipartimento di Scienze e Metodi dell'Ingegneria, Università degli Studi di Modena e Reggio Emilia**, Reggio Emilia, Italy (2019-02-14–2019-02-15).

- *Backward Euler Approximations for Conservation Laws with Discontinuous Fluxes* – "Nonlinear Hyperbolic Problems: modeling, analysis, and numerics", **Mathematisches Forschungsinstitut Oberwolfach**, Germany (2019-05-19–2019-05-25).

- *Backward Euler Approximations for Conservation Laws with Discontinuous Fluxes* – "XXI CONGRESSO DELL'UNIONE MATEMATICA ITALIANA", Pavia, Italy (2019-09-02–2019-09-07).

Referee activity

Served as a referee for the journals: Applied Mathematics and Computation, Communications in Mathematical Sciences, Communications on Pure and Applied Analysis, Discrete and Continuous Dynamical Systems, Journal of Differential Equations, Journal of Hyperbolic Differential Equations, Mathematical Models and Methods in Applied Sciences, Networks and Heterogeneous Media, NoDEA. Nonlinear Differential Equations and Applications, Nonlinear Analysis Series A: Theory, Methods & Applications, Nonlinear Analysis: Real World Applications, Nonlinear Differential Equations and Applications, SIAM Journal on Control and Optimization, SIAM Journal on Mathematical Analysis, SIAM Journal on Scientific Computing.

Teaching and Advisor Activity

Advisor of two Master Degree theses and six Bachelor Degree theses.
Several courses both in the Bachelor and Master degree:

- *Conservation Laws & Applications*, PhD level, academic year 2012/2013, 2014/2015.

- *Real Analysis and Differential Equations*, Master level, academic years 2017/2018, 2018/2019.

- *Advanced Mathematical Analysis*, Master level, academic year 2011/2012.

- *Calculus II*, Undergrad level, taught for 14 academic years.

- *Calculus I*, Undergrad level, taught for 12 academic years.

- *Statistics*, Undergrad level, taught for 6 academic years.

- *Mathematical and statistical methods*, Undergrad level, taught for 1 academic year.

- *Mathematical, statistical methods and stochastic processes*, Undergrad level, taught for 1 academic year.

RESEARCH ARTICLES

[1] Graziano Guerra and Wen Shen. Vanishing Viscosity and Backward Euler Approximations for Conservation Laws with Discontinuous Flux. *SIAM J. Math. Anal.*, 51(4):3112–3144, 2019. doi:10.1137/18M1205662.

[2] Alberto Bressan, Graziano Guerra, and Wen Shen. Vanishing viscosity solutions for conservation laws with regulated flux. *J. Differential Equations*, 266(1):312–351, 2019. doi:10.1016/j.jde.2018.07.044.

[3] Rinaldo M. Colombo and Graziano Guerra. Conservation laws with coinciding smooth solutions but different conserved variables. *Z. Angew. Math. Phys.*, 69(2):69:47, 2018. doi:10.1007/s00033-018-0942-9.

[4] Rinaldo M. Colombo and Graziano Guerra. Uniqueness of the 1D compressible to incompressible limit. *NoDEA Nonlinear Differential Equations Appl.*, 24(5):Art. 52, 15, 2017. doi:10.1007/s00030-017-0474-6.

[5] Rinaldo M. Colombo and Graziano Guerra. BV solutions to 1D isentropic Euler equations in the zero mach number limit. *J. Hyperbolic Differ. Equ.*, 13(4):685–718, 2016. doi:10.1142/S0219891616500181.

[6] Rinaldo M. Colombo and Graziano Guerra. Characterization of the solutions to ODE-PDE systems. *Appl. Math. Lett.*, 62:69–75, 2016. doi:10.1016/j.aml.2016.07.006.

[7] Rinaldo M. Colombo and Graziano Guerra. A coupling between a non–linear 1D compressible–incompressible limit and the 1D p–system in the non smooth case. *Networks and Heterogeneous Media*, 11(2):313–330, 2016. doi:10.3934/nhm.2016.11.313.

[8] Graziano Guerra and Veronika Schleper. A coupling between a 1D compressible-incompressible limit and the 1D p–system in the non smooth case. *Bull. Braz. Math. Soc. (N.S.)*, 47(1):381–396, 2016. doi:10.1007/s00574-016-0146-x.

[9] Rinaldo M. Colombo, Graziano Guerra, and Veronika Schleper. The compressible to incompressible limit of one dimensional Euler equations: the non smooth case. *Arch. Ration. Mech. Anal.*, 219(2):701–718, 2016. doi:10.1007/s00205-015-0904-8.

[10] Graziano Guerra and Wen Shen. Existence and stability of traveling waves for an integro-differential equation for slow erosion. *J. Differential Equations*, 256(1):253–282, 2014. `doi:10.1016/j.jde.2013.09.003`.

[11] Rinaldo M. Colombo, Graziano Guerra, Michael Herty, and Francesca Marcellini. A hyperbolic model for the laser cutting process. *Appl. Math. Model.*, 37(14-15):7810–7821, 2013. `doi:10.1016/j.apm.2013.02.031`.

[12] Rinaldo M. Colombo, Graziano Guerra, and Wen Shen. Lipschitz semigroup for an integro-differential equation for slow erosion. *Quart. Appl. Math.*, 70(3):539–578, 2012. `doi:10.1090/S0033-569X-2012-01309-2`.

[13] Rinaldo M. Colombo, Graziano Guerra, and Francesca Monti. Modelling the dynamics of granular matter. *IMA J. Appl. Math.*, 77(2):140–156, Apr 2012. `doi:10.1093/imamat/hxr007`.

[14] Claudia Canzi and Graziano Guerra. A simple counterexample related to the Lie–Trotter product formula. *Semigroup Forum*, 84:499–504, 2012. `doi:10.1007/s00233-011-9326-6`.

[15] Anna Cattani, Rinaldo M. Colombo, and Graziano Guerra. A hyperbolic model for granular flow. *ZAMM Z. Angew. Math. Mech.*, 92(1):72–88, 2012. `doi:10.1002/zamm.201000181`.

[16] Graziano Guerra, Michael Herty, and Francesca Marcellini. Modeling and analysis of pooled stepped chutes. *Netw. Heterog. Media*, 6(4):665–679, 2011. `doi:10.3934/nhm.2011.6.665`.

[17] Rinaldo M. Colombo and Graziano Guerra. On general balance laws with boundary. *J. Differential Equations*, 248(5):1017–1043, 2010. `doi:10.1016/j.jde.2009.12.002`.

[18] Andrea Zanchi, Francesca Salvi, Stefano Zanchetta, Simone Sterlacchini, and Graziano Guerra. 3d reconstruction of complex geological bodies: Examples from the alps. *Computers & Geosciences*, 35(1):49 – 69, 2009. 3D Modeling in Geology. `doi:10.1016/j.cageo.2007.09.003`.

[19] Graziano Guerra, Francesca Marcellini, and Veronika Schleper. Balance laws with integrable unbounded sources. *SIAM J. Math. Anal.*, 41(3):1164–1189, 2009. `doi:10.1137/080735436`.

[20] Rinaldo M. Colombo, Graziano Guerra, Michael Herty, and Veronika Schleper. Optimal control in networks of pipes and canals. *SIAM J. Control Optim.*, 48(3):2032–2050, 2009. `doi:10.1137/080716372`.

[21] Rinaldo M. Colombo and Graziano Guerra. Differential equations in metric spaces with applications. *Discrete Contin. Dyn. Syst.*, 23(3):733–753, 2009. `doi:10.3934/dcds.2009.23.733`.

[22] Rinaldo M. Colombo and Graziano Guerra. Hyperbolic balance laws with a dissipative non local source. *Commun. Pure Appl. Anal.*, 7(5):1077–1090, 2008. `doi:10.3934/cpaa.2008.7.1077`.

[23] Rinaldo M. Colombo and Graziano Guerra. On the stability functional for conservation laws. *Nonlinear Anal.*, 69(5-6):1581–1598, 2008. `doi:10.1016/j.na.2007.07.012`.

[24] Rinaldo M. Colombo and Graziano Guerra. Hyperbolic balance laws with a non local source. *Comm. Partial Differential Equations*, 32(10-12):1917–1939, 2007. `doi:10.1080/03605300701318849`.

[25] Graziano Guerra. Well-posedness for a scalar conservation law with singular nonconservative source. *J. Differential Equations*, 206(2):438–469, 2004. `doi:10.1016/j.jde.2004.04.008`.

[26] Debora Amadori, Laurent Gosse, and Graziano Guerra. Godunov-type approximation for a general resonant balance law with large data. *J. Differential Equations*, 198(2):233–274, 2004. `doi:10.1016/j.jde.2003.10.004`.

[27] Tullia Bonomi, Angelo Cavallin, Giorgio Stelluti, and Graziano Guerra. 3-d subsoil parameterisation in a plan region of north italy. *Mem. Soc. Geol. It.*, 57:543–550, 2002.

[28] Debora Amadori and Graziano Guerra. Uniqueness and continuous dependence for systems of balance laws with dissipation. *Nonlinear Anal.*, 49(7, Ser. A: Theory Methods):987–1014, 2002. `doi:10.1016/S0362-546X(01)00721-0`.

[29] Debora Amadori, Laurent Gosse, and Graziano Guerra. Global BV entropy solutions and uniqueness for hyperbolic systems of balance laws. *Arch. Ration. Mech. Anal.*, 162(4):327–366, 2002. `doi:10.1007/s002050200198`.

[30] Debora Amadori and Graziano Guerra. Global BV solutions and relaxation limit for a system of conservation laws. *Proc. Roy. Soc. Edinburgh Sect. A*, 131(1):1–26, 2001. `doi:10.1017/S0308210500000767`.

[31] Dedora Amadori and Graziano Guerra. Global weak solutions for systems of balance laws. *Appl. Math. Lett.*, 12(6):123–127, 1999. `doi:10.1016/S0893-9659(99)00090-7`.

[32] Graziano Guerra and Alfredo Lorenzi. Identification problems for linear symmetric integrodifferential systems. *J. Inverse Ill-Posed Probl.*, 7(4):299–327, 1999. `doi:10.1515/jiip.1999.7.4.299`.

[33] Alberto Bressan and Graziano Guerra. Shift-differentiability of the flow generated by a conservation law. *Discrete Contin. Dynam. Systems*, 3(1):35–58, 1997. `doi:10.3934/dcds.1997.3.35`.

[34] Gianpaolo Brivio, Tom B. Grimley, and Graziano Guerra. Quantum theory of sticking: equivalence of various approaches and application to a simple model. *Surface Science*, 320(3):344 – 354, 1994. `doi:10.1016/0039-6028(94)90322-0`.

PROCEEDINGS

[ACGS14] Debora Amadori, Rinaldo M. Colombo, Graziano Guerra, and Wen Shen. Slow erosion of granular flow: Continuous and discontinuous profiles. In Ancona

Fabio, Bressan Alberto, Marcati Pierangelo, and Marson Andrea, editors, *Hyperbolic Problems: Theory, Numerics, Applications*, volume 8 of *AIMS Series on Applied Mathematics*, pages 641–649. American Institute of Mathematical Sciences (AIMS), Springfield, MO, 2014. Proceedings of the Fourteenth International Conference on Hyperbolic Problems held in Padova, June 25-29, 2012. URL: https://www.aimsciences.org/book/AM/volume/Volume%208.

[BGS20]   Alberto Bressan, Graziano Guerra, and Wen Shen. Conservation laws with regulated fluxes. In Alberto Bressan, Marta Lewicka, Dehua Wang, and Yuxi Zheng, editors, *Hyperbolic Problems: Theory, Numerics, Applications*, volume 10 of *AIMS Series on Applied Mathematics*, pages 328–335. American Institute of Mathematical Sciences (AIMS), Springfield, MO, 2020. Proceedings of the Seventeenth International Conference on Hyperbolic Problems held at the Pennsylvania State University, University Park, June 25-29, 2018. URL: https://www.aimsciences.org/book/AM/volume/Volume%2010.

[CG08]   Rinaldo M. Colombo and Graziano Guerra. Nonlocal sources in hyperbolic balance laws with applications. In *Hyperbolic problems: theory, numerics, applications*, pages 577–584. Springer, Berlin, 2008. doi:10.1007/978-3-540-75712-2_56.

[CG09]   Rinaldo M. Colombo and Graziano Guerra. Balance laws as quasidifferential equations in metric spaces. In *Hyperbolic problems: theory, numerics and applications*, volume 67 of *Proc. Sympos. Appl. Math.*, pages 527–536. Amer. Math. Soc., Providence, RI, 2009. doi:10.1090/psapm/067.2/2605248.

[CGS13]   Rinaldo M. Colombo, Graziano Guerra, and Wen Shen. Lipschitz semigroup and traveling waves for an integro–differential equation for slow erosion. *Oberwolfach Rep.*, 10(2):1739–1742, 2013. Abstracts from the workshop held June 9–15, 2013. Organized by Rinaldo M. Colombo, Philippe G. LeFloch, Christian Rohde, Oberwolfach Reports. Vol. 10, no. 2. doi:10.4171/OWR/2013/29.

[GC16]   Graziano Guerra and Rinaldo M. Colombo. Uniqueness for a non–linear 1D compressible to incompressible limit in the non smooth case. *Oberwolfach Rep.*, 13(2):1707–1710, 2016. Abstracts from the workshop held June 19–25, 2016. Organized by Rinaldo M. Colombo, Philippe G. LeFloch, Christian Rohde, Oberwolfach Reports. doi:10.4171/OWR/2016/30.

[GS18]   Graziano Guerra and Wen Shen. Vanishing viscosity solutions of Riemann problems for models of polymer flooding. In F. Gesztesy, H. Hanche-Olsen, E. R. Jakobsen, Y. Lyubarskii, N. H. Risebro, and K. Seip., editors, *Non-linear Partial Differential Equations, Mathematical Physics, and Stochastic Analysis: The Helge Holden Anniversary Volume*, volume 14 of *EMS Series of Congress Reports (ECR)*, pages 261–285. European Mathematical Society, July 2018.