CURRICULUM VITÆ ET STUDIORUM

Chiara GUARDASONI

Department of Economics
University of Parma
Via J.F. Kennedy, 6
43125 Parma
Italy

Dept. Mathematics Office: (+39) 0521 906956
Dept. Economics Office: (+39) 0521 902462
Fax: (+39) 0521 906950
e-mail: `chiara.guardasoni@unipr.it`
Homepage: `http://www.anum.unipr.it/GuardasoniEnglish.html`

Contents

Education

- since *December 31, 2013*: researcher at the University of Parma.

- *March 1, 2013 - December 30, 2013*: research fellow at the Department of Economics of the University of Parma.

- *March 1, 2010 - February 28, 2013*: research fellow at the Department of Mathematics of the University of Parma.

- *February 23, 2010*: Post Graduate Certificate in Secondary Education of "Physics" at the University of Parma.

- *February 17, 2010*: PhD in Numerical Analysis at the University of Milan
dissertation title: *Wave Propagation Analysis with Boundary Element Method*
advisor: Prof. M. Diligenti.

- *May 25, 2006*: Post Graduate Certificate in Secondary Education of "Mathematics" at the University of Parma.

- *2005-2006*: Research activity at the Department of Mathematics of the University of Parma inside the National Project (PRIN) "Mathematical Problems in Kinetic Theories"
supervisor: Prof. G. Spiga.

- *July 13, 2004*: B.S. in Mathematics at the University of Parma
dissertation title: *The Boundary Element Method applied to Helmholtz equation* (in Italian)
advisors: Prof. M. Diligenti, Prof. A. Aimi.

Awards

- *2010*: winner of the INDAM-SIMAI-2010 prize for the best thesis (T1) in Applied Mathematics

- *2010*: publication of the PhD thesis in the series of the University of Milan

- *2006*: winner of a PhD-student grant at the University of Milan

Schools

- *Summer School "Large Scale BEM Computing"*
Faculty of Engineering, University of Brescia, 29 agosto - 2 settembre 2011.

- *19th Summer School of Parallel Computating*
Consorzio Interuniversitario di Supercalcolo CINECA di Bologna, 5-16 luglio 2010.

- *Autumn School: Introduction to Numerical Methods for Moving Boundaries*
École Nationale Supérieure de Techniques Avancées di Parigi, 12-14 novembre 2007.

Workshops and Conferences

- *POEMS monthly seminar*
Promoter: POEMS team of INRIA (Institut National de Recherche en Informatique et en Automatique Bourdeaux Sud-Ouest)
Rocquencourt-Paris (Francia), 24 novembre 2011.

- *The 9th International Conference on Mathematical and Numerical Aspects of Waves Propagation (WAVE 2009)*
Promoter: INRIA (Institut National de Recherche en Informatique et en Automatique Bourdeaux Sud-Ouest)
Pau (Francia), 15-19 giugno 2009.

- *Special day of the Seminario di Matematica Applicata: Robustness of A Posteriori Error Estimators*
Promoter: Prof. A. Veeser (Università Statale di Milano)
Dipartimento di Matematica, Università Statale di Milano, 18 settembre 2007.

Research

Research Interests

- B.S. thesis argument: Boundary Element Method (BEM) applied to Helmholtz wave problems. The Numerical Analysis unit of the University of Parma has experience on some topics connected to the application of Galerking BEM. The aim of the activity carried out during the redaction of my B.S. thesis was to extend some results already well-established for the Laplace equation in integral form to the case of Helmholtz equation using some new quadrature schemes

for weakly singular and Cauchy principal value integrals suitable for h-, p- and h-p versions of Galerking BEM technique. Part of executed work led to some considerations and numerical results described also in [TR4].

Moreover these practice turned out to be useful also in PhD research that considered the Galerking BEM applied to transient wave equation.

- *2005-2006*: numerical methods for extended kinetic theory.
  The extended kinetic theory deals with rarefied gas dynamics in presence of non-conservative reactions. The main goal of the activity developed in these years was to study kinetic models describing chemical reactions and inelastic scattering between gases with several energetic levels in their internal structures. The particular case analyzed was the one of a reversible chemical reaction governed by the hyperbolic non-linear BGK-equations: Boltzmann-like equations where the collision part is heavier.
  Together with Numerical Analysis and Mathematical Physics units of the University of Parma, I tried to find a numerical strategy to simulate the reactive BGK equations. In particular I focused on problems with axial symmetry, which are of interest in many applications like for instance the classical evaporation-condensation problem. The method I used is based on time splitting techniques, which are widely known in the numerical analysis of the classical Boltzmann equation but their application to kinetic systems describing reacting gas mixtures was not discussed until that moment, to my knowledge.
  The time splitting approach has the advantage of simplifying the problem by treating separately the two steps, the convection or transport step, which solves the free-streaming equations along the characteristic lines, and the collision step, which solves the spatially homogeneous BGK equations. The numerical solution of this latter, which can be regarded as a Cauchy problem, has been evaluated with Runge-Kutta explicit schemes of different order. Some results obtained on time-dependent Riemann problems for reacting mixtures of four gases are published in [P16], [P17], [CP27] and were presented at VIII SIMAI Congress, at the 3rd Summer School on "Methods and models of kinetic theory" and at the closure workshop for the Galileo Project (see [M38], [M39] and [M40]).

- from *2007* up to now: numerical resolution of hyperbolic transient wave equation.
  In 2007 I approached elastic wave propagation problems in multilayered media. In particular I have considered their reformulation in terms of boundary integral equations directly in space-time domain.
  Numerical results presented in [T1], [P12]-[P15] and [CP21]-[CP26] have been obtained using an approximation technique based on a particular weak formulation in time-space domain, taking advantage of some properties of the energy of the system related to transient wave problem ([P15]).
  Thanks to the simple structure of boundary integral equations, it's possible to prove coerciveness and continuity properties of the energetic quadratic form for 1D domains and, as a consequence, the unconditional stability of the numerical schemes. In 2D problems, theoretical results have been achieved in the case of a flat obstacle ([P14]).
  Numerical results have been obtained using a Galerkin discretization of weak problems. Representing the analytical solution of the integral problem with piecewise polynomial functions in the space-time domain, the applied element by element technique produces a linear system with a Toeplitz block lower triangular matrix easily solvable with appropriate accuracy without high computational costs.
  The implementation of this procedure implies during the calculation of the matrix element a double analytic integration in time variables and then numerical integration of weakly singular, singular and hypersingular double integrals in space variables with several troubles concerning their approximation. Therefore in the thesis I have developed some suitable quadrature techniques in order to achieve satisfactory precision ([P12]).

The several numerical results obtained are very interesting in comparison with other ones found in literature: instabilities phenomena are never present in the energetic procedure. First results are referred to problems with boundary conditions of Dirichlet, Neumann and mixed type in one-dimensional domains with homogeneous or non-homogeneous transient wave equations. The following ones are referred to the extension of the energetic formulation to two-dimensional problems also in multi-domains configurations modeling wave propagation in materials with different physical characteristics ([P8],[P9],[CP20],[CP19]). Some of the obtained results were presented in national and international conferences and at now, we are working to the extension to the 3D case ([CP17], [M19], [M18]) with the future possibility of relevant improvements in BEM-FEM coupling.

- Fast techniques for construction and resolution of Boundary Integral Equations linear systems.
  With the aim to extend the application of the energetic formulation to always more elaborate simulations, at the ECCM congress in Paris [M24] some initial results have been presented, showing the actual reduction of computational costs that can be obtained applying the restriction matrices method to wave propagation problems with geometrical symmetries, without loosing precision. This research project [PR2] (whom I was the supervisor) has been funded by GNCS (an Italian organization devoted to research about scientific computation) and its results have been collected in [P7]. At the ECCOMAS congress [CP12], the possibility of extension of this technique to 3D problems has been illustrated, exploiting the Plato Solids congruences also.

- Numerical methods for quantitative finance.
  A growing research topic is the adaptation of numerical techniques well consolidated in physics and engineering to the differential models developed within the Quantitative Finance. In particular, it is in development an efficient numerical method for the evaluation of financial options pricing through Heston model (1993) where the change in price volatility of a stock is correlated with the price itself [P1].

Publications

Thesis

T1. C.Guardasoni: *Wave Propagation Analysis with Boundary Element Method*, PhD Thesis, ed. Ledizioni, Milan, (2010), open access copy available at http://air.unimi.it/handle/2434/148419.

Refereed Papers on Journals or Books

P1. C.Guardasoni, S.Sanfelici: *A Boundary Element approach to barrier option pricing in Black-Scholes framework*, submitted to International Journal of Computer Mathematics.

P2. A.Aimi, L.Desiderio, M.Diligenti, C.Guardasoni: *A numerical study of energetic BEM-FEM applied to wave propagation in 2D multidomains*, Publications de l'Institut Mathématique, 96 (110), pp.5-22, (2014).

P3. A.Aimi, M.Diligenti, A.Frangi, C.Guardasoni: *Energetic BEM-FEM coupling for wave propagation in 3D multidomains*, Internat. J. Numer. Methods Engrg., 97, pp.377-394, DOI: 10.1002/nme.4602, (2014).

P4. A.Aimi, M.Diligenti, C.Guardasoni, S. Panizzi: *Energetic BEM-FEM coupling for wave propagation in layered media*, Communications in Applied and Industrial Mathematics, DOI: 10.1685/journal.caim.438, (2013).

4

P5. A.Aimi, M.Diligenti, A.Frangi, C.Guardasoni: *Neumann exterior wave propagation problems: computational aspects of 3D energetic Galerkin BEM*, Comput. Mech., 51, pp. 475-493, (2013).

P6. A.Aimi, M.Diligenti, A.Frangi, C.Guardasoni: *A stable 3D energetic Galerkin BEM approach for wave propagation interior problems*, Engineering Analysis with Boundary Elements, 36, pp. 1756-1765, (2012).

P7. A.Aimi, M.Diligenti, C.Guardasoni: *Restriction matrices in space-time energetic BEM*, Engineering Analysis with Boundary Elements, 36, pp. 1256-1271, (2012).

P8. A.Aimi, S.Gazzola, C.Guardasoni: *Energetic boundary element method analysis of wave propagation in 2D multilayered media*, Math. Methods Appl. Sci., 35, pp. 1140-1160, DOI: 10.1002/mma.1612, (2012).

P9. A.Aimi, S.Gazzola, C.Guardasoni: *Energetic BEM for domain decomposition in 2D wave propagation problems*, Communications in Applied and Industrial Mathematics, 2 (1), pp.1-22, DOI: 10.1685/journal.caim.365, (2011).

P10. A.Aimi, M.Diligenti, C.Guardasoni: *Numerical integration schemes for applications of energetic Galerkin BEM to wave propagation problems*, Riv. Mat. Univ. Parma, 2, pp. 147–187, (2011).

P11. A.Aimi, M.Diligenti, C.Guardasoni: *On the energetic Galerkin boundary element method applied to wave propagation problems*, J. of Comput. and Appl. Math., 235, pp. 1746–1754, (2011).

P12. A.Aimi, M.Diligenti, C.Guardasoni: *Numerical integration schemes for space-time hypersingular integrals in energetic Galerkin BEM*, Num. Alg., 55, pp. 145-170, (2010).

P13. A.Aimi, M.Diligenti, C.Guardasoni, I.Mazzieri, S.Panizzi: *A space-time Galerkin BEM for 2D exterior wave propagation problems*, in Applied and Industrial Mathematics in Italy III, Proceedings of the 9th Conference SIMAI, E. De Bernardis, R. Spigler, V. Valente (Eds.), World Scientific, Singapore, 82, pp. 13-24, (2010).

P14. A.Aimi, M.Diligenti, C.Guardasoni, I.Mazzieri, S.Panizzi: *An energy approach to space-time Galerkin BEM for wave propagation problems*, Internat. J. Numer. Methods Engrg., 80, pp. 1196-1240, (2009).

P15. A.Aimi, M.Diligenti, C.Guardasoni, S.Panizzi: *A space-time energetic formulation for wave propagation analysis by BEMs*, Riv. Mat. Univ. Parma, (7) 8, pp. 171-207, (2008).

P16. A.Aimi, M.Diligenti, M.Groppi, C.Guardasoni: *On the numerical solution of a BGK-type model for chemical reactions*, European J. Mech. B/Fluids, 26, pp. 455-472, (2007).

P17. A.Aimi, M.Diligenti, M.Groppi, C.Guardasoni: *Numerical approximation of a BGK-type relaxation model for reactive mixtures*, in Applied and Industrial Mathematics in Italy II, Series on Advances in Mathematics for Applied Sciences, V. Cutello, G. Fotia, L. Puccio (Eds.), World Scientific, Singapore, 75, pp. 1-12, (2007).

Conference Proceedings

CP1. A.Aimi, M.Diligenti, C.Guardasoni, S.Panizzi: *Energetic BEM-FEM coupling for the numerical solution of the damped wave equation*, in AIP Conference Procceedings of ICNAAM 2014, pp. 1-4 (2014).

CP2. A.Aimi, M.Diligenti, C.Guardasoni, S.Panizzi: *Numerical analysis of 1D damped wave equation by "energetic" weak formulation*, in ECCM V Conference Proceedings, Eds. E. Oñate, X. Oliver, A. Huerta, pp. 1-11 (2014).

CP3. A.Aimi, L.Desiderio, M.Diligenti, C.Guardasoni: *Analysis of Damped Waves Using Energetic BEM-FEM Coupling*, in Advances in Boundary Element Techniques (BETEQ), XV, Eds. V. Mallardo and M.H. Aliabadi, pp. 28-33 (2014).

CP4. C.Guardasoni, S.Sanfelici: *Fast Numerical Pricing of Barriers Options under Stochastic Volatility & Jumps*, in Abstracts of ISDESAMF 2014, p. 24 (2014).

CP5. C.Guardasoni, S.Sanfelici: *Fast Numerical Pricing of Barriers Options under Stochastic Volatility and Jumps*, in Extended Abstracts of XV Workshop on Quantitative Finance, University of Firenze, p. 1-11 (2014).

CP6. C.Guardasoni, S.Sanfelici: *A boundary element PDE approach to corporate debt*, in Abstracts CFE-ERCIM 2013, University of London, p. 97 (2013).

CP7. A.Aimi, L.Desiderio, M.Diligenti, C.Guardasoni: *Energetic BEM-FEM for 2D wave propagation problems*, in Abstracts IWATA 2013, XIV, University of Basilicata, p. 27 (2013).

CP8. A.Aimi, L.Desiderio, M.Diligenti, A.Frangi, C.Guardasoni: *Energetic BEM-FEM coupling for wave propagation in layered media*, in Advances in Boundary Element Techniques (BETEQ), XIV, Eds. A. Sellier and M.H. Aliabadi, pp. 1-6 (2013).

CP9. A.Aimi, M.Diligenti, C.Guardasoni: *Platonic Solids, Restrictions Matrices and Space-Time Energetic Galerkin BEM*, Proceedings of the 11th International Conference on Mathematical and Numerical Aspects of Waves, pp. 199-200, (2013).

CP10. A.Aimi, C.Guardasoni, S.Panizzi: *BEM-FEM coupling for the one-dimensional Klein-Gordon equation*, Proceedings of the 11th International Conference on Mathematical and Numerical Aspects of Waves, pp. 193-194, (2013).

CP11. A.Aimi, M.Diligenti, A.Frangi, C.Guardasoni: *Energetic BEM-FEM coupling for wave propagation in unbounded domains*, Proceedings of the 11th International Conference on Mathematical and Numerical Aspects of Waves, pp. 185-186, (2013).

CP12. A.Aimi, M.Diligenti, A.Frangi, C.Guardasoni, M.Manzini: *Restriction Matrices for Exploiting Symmetry in 3D Wave Propagation Analysis by Energetic BEM*, Book of abstracts of ECCOMAS Congress and CD-ROM Proceedings, pp. 1-20, (2012).

CP13. A.Aimi, M.Diligenti, A.Frangi, C.Guardasoni: *An energetic approach to BEM-FEM coupling for wave propagation phenomena*, Book of abstracts of 11th SIMAI Congress, p. 124, (2012).

CP14. A.Aimi, M.Diligenti, A.Frangi, C.Guardasoni: *A stable energetic Galerkin BEM for 3D wave propagation interior problems*, Book of abstracts of SIMAI Congress, p. 126, (2012).

CP15. A.Aimi, M.Diligenti, C.Guardasoni, S. Panizzi: *On the regularization of Galerkin BEM hypersingular bilinear forms*, Book of abstracts of the International Conference on Scientific Computing (SC2011), p. 226, (2011).

CP16. A.Aimi, A.Frangi, C.Guardasoni, S. Panizzi: *Un metodo BEM energetico di tipo Galerkin per problemi di propagazione di onde*, Conferenze e Comunicazioni XIX congresso UMI (Unione Matematica Italiana), p. 265, (2011).

CP17. A.Aimi, M.Diligenti, A.Frangi, C.Guardasoni: *On the energetic Galerkin BEM applied to 3D wave propagation problems*, Extended Abstracts of IABEM Symposium, pp. 7–12, (2011).

CP18. A.Aimi, M.Diligenti, C.Guardasoni: *Energetic Galerkin BEM for 2D Wave Propagation Problems in Piecewise Homogeneous Media*, AIP Conference Proceedings, pp. 2085–2088, (2010).

CP19. A.Aimi, M.Diligenti, C.Guardasoni, S. Gazzola: *Multi-domain BEM for two dimensional problems of wave propagation*, Book of abstracts of X SIMAI congress, p. 71, (2010).

CP20. A.Aimi, M.Diligenti, C.Guardasoni: *Exploiting geometrical simmetries*, ECCM 2010 - Abstracts. Parigi, (2010).

CP21. A.Aimi, M.Diligenti, C.Guardasoni: *Efficient numerical integration schemes for the discretization of hypersingular BIEs related to wave propagation problems*, Book of abstracts of the 2nd Dolomites Workshop on Constructive Approximation and Application (DWCAA 2009), p. 64, (2009).

CP22. A.Aimi, M.Diligenti, C.Guardasoni: *Numerical integration schemes for the discretization of BIEs related to wave propagation problems*, Proceedings of the International Conference on Computational and Mathematical Methods in Science and Engineering (CMMSE 2009), pp. 45–56, (2009).

CP23. A.Aimi, M.Diligenti, C.Guardasoni, I.Mazzieri, S.Panizzi: *An energy approach for time-domain boundary integral formulations of the wave equation*, Book of Abstracts IX SIMAI Congress, p. 1, (2008).

CP24. A.Aimi, M.Diligenti, C.Guardasoni: *Numerical results for the wave propagation problem with space-time boundary element method*, Proceedings of XVIII AIMETA Congress, CD-rom, 12 pp., (2007) or Atti del XVIII congresso dell'Associazione Italiana di Meccanica Teorica e Applicata, Eds. A. Carini, G. Mimmi and R. Piva, pp. 393-404, (2007).

CP25. A.Aimi, A.Carini, M.Diligenti, C.Guardasoni: *Numerical results of one-dimensional wave propagation analysis in layered media*, in Advances in Boundary Element Techniques (BETEQ), VIII, Eds. V. Minutolo and M.H. Aliabadi, pp. 1-6 (2007).

CP26. A.Aimi, C.Guardasoni, S.Panizzi: *One-dimensional wave propagation analysis in layered media by BEMs*, Book of Abstract of the SIMAI Meeting su Prospettive di "Sviluppo della Matematica Applicata in Italia", p. 1, (2007).

CP27. A.Aimi, M.Diligenti, M.Groppi, C.Guardasoni: *Numerical approximation of a BGK-type relaxation model for reactive mixtures*, Extended Abstracts VIII Congresso SIMAI, CD Rom, 4 pp., (2006).

Technical Reports and other publications

TR1. C.Guardasoni: *Analisi della propagazione di onde con il metodo degli elementi al contorno*, La matematica nella Società e nella Cultura: rivista della Unione Matematica Italiana. Serie I, 4 (1), pp. 55-58, (2011).

TR2. A.Aimi, M.Diligenti, C.Guardasoni: *Numerical integration schemes for the Galerkin BEM related to wave propagation problems*, Quaderni Dip. Mat. Univ. Parma, n. 495, (2009).

TR3. A.Aimi, M.Diligenti, C.Guardasoni, I.Mazzieri, S.Panizzi: *An energy approach to space-time Galerkin BEM for wave propagation problems*, Quaderni Dip. Mat. Univ. Parma, n. 487, (2008).

TR4. C. Guardasoni, *Il BEM per il problema di Dirichlet su un dominio esterno ad un arco relativo all'equazione di Helmholtz*, Quaderni Dip. Mat. Univ. Parma, n. 449, (2006).

Communications and Meetings

The asterisk indicates that the communications were personally presented.

M1. *12th International Conference of Numerical Analysis and Applied Mathematics (ICNAAM)*, Rhodes (Greece), September 22-28, 2014;
communication on: *Energetic BEM-FEM coupling for the numerical solution of the damped wave equation.*

M2. *5th European Conference on Computational Mechanics*, Barcelona (Spain), July 20-25, 2014;
communication on: *Numerical analysis of the damped wave equation by "energetic" weak formulations.*

M3. *International Conference on Boundary Element and Meshless Techniques (Beteq)*, Florence (Italy), July 15-17, 2014;
*communication on: *Numerical Analysis of Damped Waves Using Energetic BEM-FEM Coupling.*

M4. *International Symposium on Differential Equations and Stochastic Analysis in Mathematical Finance (ISDESAMF)*, Sanya (China), July 12-16, 2014;
communication on: *Fast numerical pricing of barrier options under stochastic volatility & jumps.*

M5. *Insurance & Finance day*, Parma (Italy), July 3, 2014;
*communication on: *A boundary element method for pricing barriers options.*

M6. *Convegno ECMI*, Taormina (Italy), June 09-13, 2014;
*communication on: *A boundary element method for pricing barriers options.*

M7. *Biennial GNCS-INdAM Conference*, Montecatini Terme (Italy), February 19-20, 2014;
communication on: *Fast Methods for the numerical resolution of systems of integro-differential equations.*

M8. *XV Workshop on Quantitative Finance*, Florence (Italy), January 23-24, 2014;
communication on: *Fast Numerical Pricing of Barriers Options under Stochastic Volatility and Jumps.*

M9. *7th International Conference on Computational and Financial Econometrics (CFE)*, London (United Kingdom), December 14-16, 2013;
*communication on: *A boundary element PDE approach to corporate debt.*

M10. *International Workshop on Approximation Theory and Applications (IWATA)*, Potenza (Italy), September 12-13, 2013;
*poster: *Energetic BEM-FEM for 2D wave propagation problems.*

M11. *International Conference on Boundary Element and Meshless Techniques (BETEQ)*, Paris (France), July 16-18, 2013;
*communication on: *Energetic BEM-FEM coupling for wave propagation in layered media.*

M12. *The 11th International Conference on Mathematical and Numerical Aspects of Waves (Waves 2013)*, Tunis (Tunisia), June 3-7, 2013;
*communication on: *Platonic Solids, Restrictions Matrices and Space-Time Energetic Galerkin BEM*,
communication on: *Energetic BEM-FEM coupling for wave propagation in unbounded domains*
communication on: *BEM-FEM coupling for the one-dimensional Klein-Gordon equation.*

M13. *Perspectives on Development of the Applied Mathematics in Italy 2013 (Workshop SIMAI)*, Rome (Italy), March 11, 2013;
*<u>communication on</u>: *The energy based method applied to damped wave equation.*

M14. *ECCOMAS Congress 2012*, Wien (Austria), September 10-14, 2012;
*<u>communication on</u>: *Restriction Matrices for Exploiting Symmetry in 3D Wave Propagation Analysis by Energetic BEM.*

M15. *SIMAI Congress 2012*, Turin (Italy), June 25-28, 2012;
*<u>communication on</u>: *A stable energetic Galerkin BEM for 3D wave propagation interior problems*,
<u>communication on</u>: *An energetic approach to BEM-FEM coupling for wave propagation phenomena.*

M16. *BEM on the Saar 2012*, Saarbrücken (Germany), May 14-16, 2012;
<u>communication on</u>: *An energy based BEM-FEM coupling for wave propagation problems: first results.*

M17. *International Conference on Scientific Computing 2011*, S. Margherita di Pula (Cagliari, Italy), October 10-14, 2011;
<u>poster</u>: *On the regularization of Galerkin BEM hypersingular bilinear forms.*

M18. *XIX Congresso dell'Unione Matematica Italiana*, Bologna (Italy), September 12-17, 2011;
<u>communication on</u>: *Un metodo BEM energetico di tipo Galerkin per problemi di propagazione di onde.*

M19. *Symposium of the International Association for Boundary Element Methods (IABEM)*, Brescia (Italy), September 5-8, 2011;
*<u>communication on</u>: *On the energetic Galerkin BEM applied to 3D wave propagation problems.*

M20. *Time Domain Boundary Integral Equations: Algorithms, Analysis, Applications*, Leipzig (Germany), May 4-6, 2011;
<u>communication on</u>: *Energetic Galerkin BEM and domain decomposition for 2D wave propagation problems in multi-layered media.*

M21. *Perspectives on Development of the Applied Mathematics in Italy 2011 (Workshop SIMAI)*, Rome (Italy), April 8, 2011;
*<u>communication on</u>: *Wave Propagation Analysis with Boundary Element Method.*

M22. *International Conference on Numerical Analysis and Applied Mathematics (ICNAAM)*, Rhodes (Greece), September 19-25, 2010;
*<u>communication on</u>: *Energetic Galerkin BEM for 2D Wave Propagation Problems in Piecewise Homogeneous Media.*

M23. *X SIMAI Congress*, Cagliari (Italy), June 21-25, 2010;
*<u>communication on</u>: *Multi-domain BEM for two dimensional problems of wave propagation.*

M24. *IV European Conference on Computational Mechanics*, Paris (France), May 16-21, 2010;
*<u>communication on</u>: *Exploiting geometrical symmetries in space-time BIEs discretization.*

M25. *Integral Equations: recent numerical developments and new applications*, Parma (Italy), October 29-30, 2009;

M26. *2nd Dolomites Workshop on Constructive Approximation and Applications (DWCAA09)*, Alba di Canazei (Trento, Italy), September 4-9, 2009;
*<u>communication on</u>: *Efficient numerical integration schemes for the discretization of hypersingular BIEs related to wave propagation problems.*

M27. *The 9th International Conference Computational and Mathematical Methods in Science and Engineering (CMMSE)*, Gijón (Spain), June 30-July 3, 2009;
*<u>communication at invitation, on</u>: *Numerical integration schemes for the discretization of BIEs related to wave propagation problems.*

M28. *The 9th International Conference on Mathematical and Numerical Aspects of Waves Propagation (WAVES "09)*, Pau (France), June 15-19, 2009.

M29. *Biennial GNCS-INdAM Conference*, Montecatini Terme (Pistoia, Italy), February 3-5, 2009;
*<u>communication on</u>: *Developments in Boundary Element Methods for Wave Propagation Problems.*

M30. *International Workshop: "Advanced Numerical Methods in Seismology"*, Brescia (Italy), November 14, 2008;
<u>communication on</u>: *Boundary element methods for earthquake simulations: an introduction.*

M31. *IX SIMAI Congress*, Rome (Italy), September 15-19, 2008;
*<u>communication on</u>: *An energetic approach for time-domain Boundary Integral Formulations of the wave equation.*

M32. *BEM on the Saar 2008*, Saarbrücken (Germany), May 25-29, 2008;
*<u>communication on</u>: *A space-time approach for BEM related to wave propagation analysis,*
<u>communication on</u>: *On analytical integrations and time marching schemes in 3D BEM elastodynamics.*

M33. *Biennial GNCS-INdAM Conference*, Montecatini Terme (Pistoia, Italy), February 4-6, 2008;
*<u>communication on</u>: *A space-time energetic approach for BEM related to wave propagation analysis in layered media.*

M34. *Boundary Integral Equations: recent numerical developments and new applications*, Parma (Italy), September 27-28, 2007;
<u>communication on</u>: *Numerical results for the wave propagation problem with space-time boundary element method.*

M35. *XVIII AIMETA National Conference*, Brescia (Italy), September 11-14, 2007;
*<u>communication on</u>: *Numerical results for the wave propagation problem with space-time boundary element method,*
<u>communication on</u>: *Space-time variational formulations for BIEs related to the wave problem.*

M36. *BETEQ 2007, International Conference on Boudary Element Techniques*, Naples (Italy), July 24-26, 2007;
*<u>communication on</u>: *Numerical results of one dimensional wave propagation analysis in layered media,*
<u>communication on</u>: *Remarks on space-time variational formulations for BIEs related to the wave problem.*

M37. *SIMAI Conference: "Development of the Applied Mathematics in Italy"*, Parma (Italy), May 18-19, 2007;
*<u>comunicazione</u>: *One dimensional wave propagation analysis in layered media by BEMs.*

M38. *VIII SIMAI Congress*, Baia Samuele (Ragusa, Italy), May 22-26, 2006;
<u>communication on</u>: *Numerical approximation of a BGK-type relaxation model for reactive mixtures.*

M39. *3rd summer school on "Methods and models of kinetic theory"*, Porto Ercole (Grosseto, Italy), June 4-10, 2006;
<u>poster</u>: *On the BGK approximation of reactive flows: theoretical and numerical aspects* .

M40. *Closure Workshop for the Galileo Project*, Paris (France), November 18-19, 2005;
<u>communication on</u>: *On the Riemann Problem for Reactive BGK Equations.*

Financed Projects

PR1. Research Fellow Program (GNCS-2013): *Integral equations approach for numerical resolution of Quantitative Finance problems;*
coordinatore: Dott.ssa C. Guardasoni.

PR2. Research Fellow Program (GNCS-2010): *Application of Restriction Matrices to Boundary Element Method for evolutionary problems;*
supervisor: C. Guardasoni.

PR3. Research Projet GNCS-2013: *Fast methods for the numerical resolution of systems of integro-differential equations;*
supervisor: Dott.ssa A. Aimi.

PR4. Research Projet GNCS-2012: *Coupling of Numerical Methods for BIEs and PDEs related to external and multi-layers evolutionary problems;*
supervisor: Dott.ssa A. Aimi.

PR5. Progetti di Ricerca GNCS-2011: *Numerical Methods for problems of elastic waves propagation in multi-domains;*
supervisor: Dott.ssa A. Aimi.

PR6. Italian Research Program (PRIN 2009): *Boundary Element Method Method for elastic waves propagation problems;*
supervisor: Prof. M. Diligenti.

PR7. Italian Research Program (PRIN 2007): *Boundary Element Method Method for elastic waves propagation problems;*
supervisor: Prof. M. Diligenti.

PR8. Italian Research Program (PRIN 2007): *Advanced Numerical Methods for evolutionary equations and multi-scale problems;*
supervisor: Prof. G. Naldi.

Teaching Experience

- academic year *2014-2015*: collaboration to the course **Numerical Analysis** for the degree courses in Mathematics and in Informatics at the University of Parma.

- academic year *2013-2014*: regular teacher of the course **Approximation Methods** for the degree course in Applied Mathematics at the University of Parma.

- academic year *2013-2014*: regular teacher of the course **Financial and Computational Mathematics** for the teaching qualification course in Applied Mathematics at the University of Parma.

- *September 2013*: cycle of seminars "**Mathematics of Secondary School in the study of economic disciplines**" for the degree course in Economics at the University of Parma.

- *graduation session 28/02/2012*: assistant advisor for the graduation thesis in **Numerical Analysis** with title "BEM-FEM coupling for the numerical resolution of boundary elliptic problems", for the degree course in Applied Mathematics at the University of Parma.

- academic year *2011-2012*: regular teacher of the course **Mathematical Analysis** for the degree course in Applied Mathematics at the University of Parma.

- academic year *2010-2011*: regular teacher of the course **Approximation Methods** for the degree course in Applied Mathematics at the University of Parma.

- *graduation session 19/10/2010*: assistant advisor for the graduation thesis in **Numerical Analysis** with title "An energetic boundary elements technique for wave propagation problems in multi-domains", for the degree course in Applied Mathematics at the University of Parma.

- academic year *2009-2010*: collaboration to the course **Laboratory of Numerical Computation** for the degree courses in Mathematics and Informatics at the University of Parma.

- *November-December 2009*: training in Secondary Education Schools in Parma.

- *November 2008*: lessons at the basic course of **Mathematics** for the degree course in Biotechnology at the University of Milan.

- academic year *2008-2009*: collaboration to the course **Laboratory of Numerical Computation** for the degree courses in Mathematics and Informatics at the University of Parma.

- academic year *2007-2008*: collaboration to the course **Numerical Analysis** for the degree courses in Civil, Environmental and Telecommunications Engineering and to the course **Laboratory of Numerical Computation** for the degree courses in Mathematics and Informatics at the University of Parma.

- academic year *2006-2007*: collaboration to the course **Numerical Analysis** for the degree courses in Civil, Environmental and Telecommunications Engineering at the University of Parma.

- *January 1-November 30, 2006*: tutorial activities at the course **Numerical Analysis** for the degree courses in Civil, Environmental and Telecommunications Engineering at the University of Parma.

- *2005-2006*: training and temporary posts in Secondary Education Schools in Parma.

Organization Activities

- Part of the organizing committee of the second edition of the workshop (`http://www.anum.unipr.it/`)
  Integral Equations: recent numerical developments and new applications
  that took place at the University of Parma, October 29-30, 2009.

- Part of the organizing committee of the workshop
  Boundary Integral Equations: recent numerical developments and new applications
  that took place at the University of Parma, September 27-28, 2007.

Parma, December 30, 2014

Chiara GUARDASONI