

## Short CV of Luisa Donatella Marini

Graduated in Mathematics at the University of Pavia in 1970.

Researcher of C.N.R. at the Istituto di Analisi Numerica in Pavia (now IMATI-CNR) from April 1, 1973 to October 31, 1990.

Professor of Numerical Analysis at the University of Genova from November 1, 1990 to October 31, 1993, and then at the University of Pavia since November 1, 1993.

### Journals

Associate editor of SISSC (SIAM Journal on Scientific and Statistical Computing) for two terms, from January 1988 to December 1993.

Associate editor of CMAME (Computer methods in Applied Mechanics and Engineering) since 2001.

Associate editor of Italian Journal of Pure and Applied Mathematics since 2008.

### Various scientific activities (last years)

- Director of the school “Numerical methods for Pde’s”, IESC, Cargese, September 5-9, 2016.

- SIMAI representative in the General Assembly and Managing Board of ECCOMAS since 2014.

- Chair of the committee for the ICIAM 2015 Collatz prize.

-Member elected of the European Academy of Science since October 2010.

-Member of the Committee for PhD programs at the University of Pavia since 1999, and then Director of the Doctoral School of “Scienze e Tecnologie A. Volta” of the University of Pavia from 2009 to 2013.

-Member of the Scientific Council of INdAM-GNCS from November 2004 to December 2008, and then again from June 2013.

-Responsible of the scientific project “Integrated action Italy-Spain” (MIUR-2009).

### Invited (recent) lectures

- 19th International Conference on Finite Elements in Flow Problems (FEF2017), Rome, 5-7 April, 2017.

- Topics in Applied Nonlinear Analysis: Recent Advances and New Trend, conference in honor of David Kinderlehrer's 75th birthday, Carnegie Mellon University, July 18-20, 2016.

- MAFELAP 2016, Brunel University, 14-17 June, 2016.

- ECCOMAS 2016 Conference, Crete island, 5-10 June, 2016.

- Non-linear Partial Differential Equations: theories, numerics and applications,

- conference in honour of Peter Markowich 60th birthday, Hong Kong, May 20-23, 2016.
- Computational Reduction Strategies in Fluid Mechanics and Fluid-Structure Interactions, SISSA, Trieste, 13-14 July, 2015.
- Advances in Computational Fluid-Structure Interactions and Flow Simulation (AFSI 2015), Istanbul, May 11-13, 2015.
- 18th International Conference on Finite Elements in Flow Problems (FEF2015), Taipei, 16-18 March, 2015.
- Structure-Preserving Discretizations of Partial Differential Equations, a conference in honour of Doug Arnold 60th birthday, Minneapolis, October 22-24, 2014.
- Structure-preserving and Polyhedral Discretizations, WCCM XI, Barcelona, 20-25 July 2014.
- Robust Discretization and Fast Solvers for Computable Multi-Physics Models, ICERM, Brown University, Providence, May 12-16, 2014.
- Advances in Computational Fluid-Structure Interaction and Flow Simulation, a conference in honour of Tayfun Tezduyar, Tokyo, March 19-21, 2014.
- TH70- a conference in honor of Tom Hughes, San Diego, 24-28 February 2013.
- Discretization Methods on Polygonal and Polyhedral Meshes, Milano, September 17-19, 2012.
- Barrett Lectures "Recent developments in Discontinuous Galerkin Methods", Knoxville, May 9-11, 2012.
- ICIAM 2011, Vancouver, July 18-22, 2011.
- Int. Conference "Discontinuous Galerkin Methods for Pde's", Heraklion, September 26-28, 2011.
- Int. Conference "Frontiers of Computational and Applied Mathematics", Beijing, October 21-25, 2011.
- Penn State University, April 2010.
- School on Discontinuous Galerkin methods, Dobbiaco, June 21-25, 2010.

## **Scientific activity**

My scientific production consists of about 100 scientific papers, most of them in international journals, mainly on Numerical Methods for Partial Differential Equations. My field of interest is, generally speaking, the analysis of numerical schemes for the solution of elliptic partial differential equations (of second and fourth order) by means of different kinds of finite element methods: conforming, non-conforming, hybrid, mixed, and equilibrium. More specifically, I applied finite element techniques for the treatment of problems coming from various applications: semiconductor device simulation, electromagnetism, fluid-dynamics, structural mechanics. Particular emphasis was given to the approximation of non-coercive problems, which lead to develop various techniques for stabilizing Galerkin formulations, for applications to domain decomposition methods with non-matching grids, and to advection dominated problems. In the last decade I was particularly interested in developing and analyzing schemes based on Discontinuous Galerkin methods, for the discretization of various applied problems, such as Darcy

flows, advection-diffusion problems, and Reissner-Mindlin model for plate problems. The more recent production is devoted to a new technique, the Virtual Element Method, for the discretization of Pde's with applications. For a more exhaustive description I refer to the list of the latest publications.

### **Publications (last years)**

**L. Beirão da Veiga, F. Brezzi, L.D. Marini, A. Russo** *Serendipity Face and Edge VEM spaces*, RENDICONTI LINCEI-MATEMATICA E APPLICAZIONI **28**, 2017, 143-180.

**L. Beirão da Veiga, F. Brezzi, L.D. Marini, A. Russo** *Virtual Element implementation for general elliptic equations*, in Building Bridges: Connections and Challenges in Modern Approaches to Numerical Partial Differential Equations, (G.R. Barrenechea, F. Brezzi, A. Cangiani, E. H. Georgoulis Eds.), LNCSE **114**, Springer, 2016, 39-71.

**L. Beirão da Veiga, F. Brezzi, L.D. Marini, A. Russo** *Serendipity Nodal VEM spaces*, Computers and Fluids **141**, 2016, 2-12.  
<http://dx.doi.org/10.1016/j.compfluid.2016.02.015>

**C. Chinosi, L.D. Marini** *Virtual Element Methods for fourth order problems:  $L^2$  estimates*, Comput. Math. Appl. **72**(8), 2016, 1959-1967.  
<http://authors.elsevier.com/a/1Tv6J3CDPPjFwM>

**L. Beirão da Veiga, F. Brezzi, L.D. Marini, A. Russo** *Mixed Virtual Element Methods for general second order elliptic problems on polygonal meshes*, ESAIM: M2AN **50**(3), 2016, 727-747.

**L. Beirão da Veiga, F. Brezzi, L.D. Marini, A. Russo** *Virtual Element Methods for general second order elliptic problems on polygonal meshes*, Math. Models Methods. Appl. Sci. **26**(4), 2016, 729-750.

**L. Beirão da Veiga, F. Brezzi, L.D. Marini, A. Russo**  *$H(\text{div})$  and  $H(\text{curl})$ -conforming VEM*, Numer. Math. **133**(2), 2016, 303-332 (online July 2015).

**F. Brezzi, L.D. Marini** *A quick tutorial on DG methods for elliptic problems*, in The IMA Volumes in Mathematics and its Applications **157**, 2014, 1-24, (2012 John H. Barrett Memorial Lectures, Xiaobing Feng and Ohannes Karakashian eds.)

**F. Brezzi, L.D. Marini** *Virtual Element and Discontinuous Galerkin Methods*, in The IMA Volumes in Mathematics and its Applications **157**, 2014, 209-221, (2012 John H. Barrett Memorial Lectures, Xiaobing Feng and Ohannes Karakashian eds.)

**L. Beirão da Veiga, F. Brezzi, L.D. Marini, A. Russo** *The Hitchhiker's Guide to the Virtual Element Method*, Math. Models Methods. Appl. Sci. **24**(8), 2014, 1541-1573.

**F. Brezzi, R.S. Falk, L.D. Marini** *Basic principles of mixed Virtual Element Methods*, ESAIM: Math. Mod. Numer. Anal. **48(4)**, 2014, 1227-1240.

**B. Ayuso de Dios, F. Brezzi, L.D. Marini, J. Shu, L. Zikatanov** *A Simple Preconditioner for a Discontinuous Galerkin Method for the Stokes Problem*, J. Sci. Comput.**58(3)**, 2014, 517-547.

**B. Ahmad, A. Alsaedi, F. Brezzi, L.D. Marini A. Russo** *Equivalent projectors for Virtual Element Methods*, Comput. Math. Appl.**66(3)**, 2013, 376-391.

**F. Brezzi, L.D. Marini** *Virtual Element Method for plate bending problems*, Comput. Methods Appl. Mech. Engrg. (online: 27 Sept. 2012, DOI:10.1016), **253**, 2013, 455-462.

**L. Beirão da Veiga, F. Brezzi, L.D. Marini** *Virtual Elements for linear elasticity problems*, SIAM J. Numer. Anal. **51(2)**, 2013, 794-812.

**L. Beirão da Veiga, F. Brezzi, A. Cangiani, G. Manzini, L.D. Marini, A. Russo** *Basic principles of Virtual Element Methods*, Math. Models Methods. Appl. Sci. **23(1)**, 2013, 199-214.

**Blanca Ayuso de Dios, F. Brezzi, Oto Havle, L.D. Marini** *L2-estimates for the DG IIPG-0 scheme*, Numerical Methods for Partial Differential equations, (online: 15 JUN 2011), DOI: 10.1002/num.20687, **28(5)**, 2012, 1440-1465.

**K.-J. Bathe, F. Brezzi, L.D. Marini** *The MITC9 shell element in plate bending: mathematical analysis of a simplified case*, Comput. Mech. **47**, (2011), 617-626.

**F. Brezzi, J.A. Evans, T.J.R. Hughes, L.D. Marini** *New rectangular plate elements based on twist-Kirchhoff theory*, Comput. Methods Appl. Mech. Engrg. **200(33-36)**, (2011), 2547-2561.