

## CURRICULUM VITAE

### **Marino ZENNARO**

Full Professor of Numerical Analysis  
Dipartimento di Matematica e Geoscienze  
Università di Trieste  
I-34100 Trieste, Italy

- Born in Trieste (Italy) on July 13, 1958
- Married, two sons

### **Education**

Degree in Mathematics, University of Trieste, Italy, on 19/11/1981 with votation: 110/110 e lode.  
Thesis: "Numerical methods for searching periodic solutions of delay differential equations". Advisor: Prof. A.Bellen

### **Positions held**

1983-1987: Researcher in Numerical Analysis, Faculty of Sciences, University of Trieste, Italy  
1987-1990: Associate Professor of "Approximation Methods", Faculty of Sciences, University of Udine, Italy  
1987-1990: Temporary Professor of "Logic of Digital Computers and Programming Theory", Faculty of Sciences, University of Trieste, Italy  
1990-1993: Full Professor of "Numerical Calculus", Faculty of Sciences, University of L'Aquila, Italy  
1993-: Full Professor of "Numerical Analysis", Faculty of Sciences, University of Trieste, Italy  
1999-: Member of the Committee of "Doctoral School in Mathematical Sciences" - section "Computational Mathematics" - of the University of Padova

### **Teaching experience**

- Undergraduate: Numerical Analysis, Computer Science
- PhD: Numerical Analysis

### **Research topics**

- Use of the gaussian collocation method in the numerical solution of boundary value problems for differential equations with functional arguments.
- Integral representation of inverse difference differential operators in periodic function spaces.
- Statement of some maximum principles that allow one to apply monotone iterative techniques to the search for periodic solutions of nonlinear ordinary and delay differential equations.
- Use of the one-step gaussian collocation method in the numerical solution of initial value problems for ordinary and delay differential equations, with particular reference to the study of stability.
- Definition and study of continuous extensions of Runge-Kutta methods with application to delay differential equations and stability analysis of the resulting methods.
- Design of algorithms for the employment of parallel computers to the numerical solution of initial value problems for ordinary and delay differential equations.
- Stability analysis of the interpolants of Runge-Kutta methods.
- Study of Runge-Kutta methods for the numerical solution of Volterra integral equations of the second kind and of their stability properties.
- Study of the class of explicit continuous Runge-Kutta methods with particular emphasis on the problem of the minimum number of stages.
- Study of a particular class of two-step Runge-Kutta methods with particular emphasis on the order conditions and on the local error estimate.
- Study and development of "waveform relaxation" techniques for the numerical solution of

large systems of ordinary differential equations in parallel computing environments.

- Definition and study of some contractivity properties of Runge-Kutta methods and their interpolants with respect to test equations with forcing terms. Applications to delay differential equations and to “waveform relaxation” techniques.
- Study of a particular class of General Linear Methods with particular emphasis on the order conditions and on the regularity properties.
- Study of the regularity properties of Runge-Kutta methods for the numerical solution of ordinary and delay differential equations.
- Study of the error growth functions of the Runge-Kutta methods with applications to the asymptotic stability analysis.
- Development of methods for the computation of the “joint spectral radius” of matrix families with applications to the stability analysis of linear discrete dynamical systems.
- Stability analysis of exponential Runge-Kutta methods.
- Stability analysis of Runge-Kutta methods for stiff functional differential equations.
- Definition and study of “balanced complex polytopes” and related vector and matrix norms with development of constructive algorithms and applications to the computation of the “joint spectral radius”.

### **Invited presentations**

- Halle (Germany), 22-26/5/1989: NUMDIFF-5
- Amsterdam (Holland), 24/11/1989: Recent Advances in the Numerical Solution of Initial Value Problems
- Tempe (Arizona - U.S.A.), 25-28/5/1990: The International Conference on the Numerical Solution of Volterra and Delay Equations
- Grado (Italy), 10-13/9/1991: International Conference on Parallel Methods for Ordinary Differential Equations: the State of the Art
- Durham (England), 4-14/7/1992: LMS-SERC Symposium on Continuous and Discretized Evolutionary Problems
- Leicester (England), 18-29/7/1994: 6th SERC Numerical Analysis Summer School
- Cluj-Napoca (Romania), 27-30/9/1994: Nonlinear Operators, Differential Equations and Theory of Control
- Tempe (Arizona - U.S.A.), 27-30/5/1996: The Second International Conference on the Numerical Solution of Volterra and Delay Equations
- Athens (Greece), 10-17/7/1996: World Congress of Nonlinear Analysts
- Bari (Italy), 9-10/6/1998: Workshop on Numerical Methods for ODEs
- Woudschoten (Holland), 23-25/9/1998: Woudschoten Conference of the Dutch Community of Numerical Mathematicians
- Fraser Island (Queensland - Australia), 9-13/8/1999: SciCADE99
- Auckland (New Zealand), 16-20/8/1999: ANODE99
- Catania (Italy), 19-26/7/2000: World Congress of Nonlinear Analysts
- Halle (Germany), 8-11/9/2003: NUMDIFF-10
- Grado (Italy), 17-19/11/2003: Third China-Italy Joint Conference on Computational and Applied Mathematics
- Tempe (Arizona - U.S.A.), 18-21/5/2004: The Third International Conference on the Numerical Solution of Volterra and Delay Equations
- Nagoya (Japan), 23-27/5/2005: SciCADE05
- Gdansk (Poland), 23-24/6/2005: Differential-Functional Equations
- Dobbiaco (Italy), 26-30/6/2006: Summer School on Delay Differential Equations and Applications
- Torino (Italy), 3-7/7/2006: Mathematics and its Applications
- Perugia (Italy), 18-22/6/2007: Joint International Meeting UMI-DMV
- Vienna (Austria), 17-20/9/2008: SDIDE08
- Cetraro (Italy), 27/6-1/7/2011: CIME-EMS Summer School in Applied Mathematics
- Vancouver (Canada), 18-22/7/2011: ICIAM 2011

- Valladolid (Spain), 16-20/9/2013: SciCADE13

### Presentations in person

- Oberwolfach (West Germany), 6-12/6/1982: Differential-Differenzen Gleichungen, Anwendungen und Numerische Probleme
- Wurzburg (West Germany), 23-28/8/1982: Equadiff 82
- Bologna (Italy), 28-30/3/1983: Convegno di Analisi Numerica
- Perugia (Italy), 2-7/9/1983: XII Congresso U.M.I.
- Mannheim (West Germany), 8-11/10/1984: Delay Equations, Approximation and Application
- Stockholm (Sweden), 7-11/1/1985: Joint U.S.-Scandinavian Symposium on Scientific Computing and Mathematical Modelling
- Dundee (Scotland), 25-28/6/1985: XI Biennial Conference on Numerical Analysis
- Sorrento (Italy), 30/9-2/10/1985: Convegno di Analisi Numerica
- Albuquerque (New Mexico, U.S.A.), 28/7-1/8/1986: 1986 ODE Conference
- Roma (Italy), 26-28/9/1988: Convegno Nazionale di Analisi Numerica
- Helsinki (Finland), 18-22/6/1990: The 1990 Conference on the Numerical Solution of Ordinary Differential Equations
- Washington (District of Columbia - U.S.A.), 8-12/7/1991: ICIAM 91
- Dublin (Eire), 22-26/7/1991: IMACS 91
- Auckland (New Zealand), 4-8/1/1993: SciCADE93
- Palo Alto (California - U.S.A.), 28/3-1/4/1995: SciCADE95
- Geneve (Switzerland), 26-29/6/2002: Conference on Scientific Computation
- Montecatini (Italy), 9-11/2/2004: Convegno GNCS 2004
- Trieste (Italy), 11/10/2005: NADay2005
- Capito (Italy), 13-16/6/2006: Structural Dynamical Systems: Computational Aspects
- Innsbruck (Austria), 12-15/9/2007: Time Integration of Evolution Equations
- Ljubljana (Slovenia), 13/6/2008: NADay2008
- Capito (Italy), 8-11/6/2010: Structural Dynamical Systems: Computational Aspects
- Innsbruck (Austria), 13-16/5/2012: Innovative Time Integration
- Pamplona (Spain), 16-19/4/2013: SDIDE2013

### Colloquium talks

- Norwegian Institute of Technology, Trondheim (Norway), 6/5/1986
- University of Toronto, Toronto (Canada), 24/7/1986
- University of Arkansas, Fayetteville (Arkansas, U.S.A.), 5/8/1986
- Arizona State University, Tempe (Arizona, U.S.A.), 9/12/1987
- O.N.E.R.A., Chatillon - Paris (France), 21/11/1988
- Arizona State University, Tempe (Arizona - U.S.A.), 26/10/1989
- University of Leiden, Leiden (Holland), 23/11/1989
- University of Toronto, Toronto (Canada), 5/7/1991
- University of Zaragoza, Zaragoza (Spain), 14/1/1992
- Arizona State University, Tempe (Arizona, U.S.A.), 31/8/1992
- Arizona State University, Tempe (Arizona - U.S.A.), 10/3/1993
- Seminario Matematico e Fisico di Milano, Milano (Italy), 31/5/1993
- The Norwegian Institute of Technology, Trondheim (Norway), 17/6/1993
- University of Bari, Bari (Italy), 27/7/1993
- University of Toronto, Toronto (Canada), 13/9/1993
- Université de Genève, Genève (Swisse), 28/9/1995
- Istituto per le Applicazioni della Matematica del C.N.R., Napoli (Italy), 25/2/1997
- Université de Rennes, Rennes (France), 2/10/1997
- University of L'Aquila, L'Aquila (Italy), 25/5/1998
- University of Valladolid, Valladolid (Spain), 8/6/1999
- University of Bremen, Bremen (Germany), 16 e 18/7/2002
- Arizona State University, Tempe (Arizona - U.S.A.), 10/10/2002

**Visiting activity**

- Arizona State University, Tempe (Arizona - U.S.A.), 1-31/10/1989
- University of Zaragoza, Zaragoza (Spain), 8-17/1/1992
- Arizona State University, Tempe (Arizona - U.S.A.), 8/3-7/4/1993
- The Norwegian Institute of Technology, Trondheim (Norway), 12-19/6/1993
- Queen's University, Kingston (Canada), 30/8-12/9/1993
- I.R.I.S.A., Rennes (France), 29/9-3/10/1997
- University of Valladolid, Valladolid (Spain), 5-10/6/1999
- University of Bremen, Bremen (Germany), 8-20/7/2002
- Arizona State University, Tempe (Arizona - U.S.A.), 7-26/10/2002

**Professional and organizational services**

- Referee of many international journals, among which: BIT, SIAM J. Numer. Anal., J. Comput. Appl. Math., Math. Comp., TOMS, Appl. Numer. Math., Computing
- Member of the Organizing-Scientific Committee of the “International Conference on Parallel Methods for Ordinary Differential Equations: the State of the Art”, Grado (Italy), 10-13/9/1991, and Editor of the Proceedings appeared in Appl. Numer. Math. 11 (1993)
- Member of the Organizing-Scientific Committee of “SciCADE97”, Grado (Italy), 15-19/9/1997
- Member of the Organizing-Scientific Committee of “Summer School on Numerical Treatment of Dynamical Systems”, Dobbiaco (Italy), 17-21/6/2002
- Organizer of the workshop “Problematiche di interfacciamento tra metodologie numeriche per ODE e PDE”, Trieste (Italy) 18-19/12/2003
- Member of the Organizing-Scientific Committee of “Summer School on Mathematical Models in Life Science: Theory and Simulation”, Dobbiaco (Italy), 1-5/7/2005
- Member of the Organizing-Scientific Committee of “NADay2005”, Trieste (Italy), 11/10/2005
- Organizer of the minisymposium “Delay differential equations” within “SciCADE07”, St. Malo (France), 9-13/7/2007
- Member of the Organizing-Scientific Committee of “Summer School on Molecular Dynamics and Time Integration of PDEs”, Dobbiaco (Italy), 23-27/6/2008
- Organizer of the minisymposium “Delay differential equations” within “SciCADE09”, Beijing (China), 25-29/5/2009
- Member of the Organizing-Scientific Committee of “Summer School on ODEs with Discontinuous Right-Hand Side: Theory and Applications”, Dobbiaco (BZ), 22-26/6/2009
- Member of the Organizing-Scientific Committee of “Summer School on Discontinuous Galerkin Methods: Theory and Applications”, Dobbiaco (BZ), 21-25/6/2010
- Member of the Organizing-Scientific Committee of “Summer School on Approximation Theory, Spectral Methods and Chebfun”, Dobbiaco (BZ), 12-17/6/2011
- 1/11/2008-31/12/2011: Vice-director of Dipartimento di Matematica e Informatica, University of Trieste, Italy
- Member of the Organizing-Scientific Committee of “Summer School on Exponential Integrators and Numerical Methods for Multiscale PDEs”, Dobbiaco (BZ), 24-29/6/2012
- 8/11/2011-19/12/2012: President of the Course of Studies in Mathematics of the University of Trieste.
- Member of the Organizing-Scientific Committee of “Summer School on Geometric Integration of Ordinary and Partial Differential Equations”, Dobbiaco (BZ), 16-21/6/2013
- Member of the Organizing-Scientific Committee of “Summer School on Matrix Theory and Computation with Applications to Network Analysis, Quantum Chemistry and Dynamical Systems”, Dobbiaco (BZ), 15-20/6/2014

**Coordination of research grants**

- National and local Coordinator of the Project “Problematiche di interfacciamento tra metodologie numeriche per equazioni differenziali ordinarie e alle derivate parziali” of INdAM (Gruppo Nazionale per il Calcolo Scientifico) in the year 2003.

- National and local Coordinator of the Project “Metodi numerici e software matematico per problemi di evoluzione” of INdAM (Gruppo Nazionale per il Calcolo Scientifico) in the year 2004.
- National and local Coordinator of the Project “Metodi numerici per equazioni differenziali funzionali” of MIUR (PRIN–COFIN 2004) in the years 2005-2006.
- Coordinator of the Project “Metodi numerici e stabilità di equazioni differenziali funzionali” of INdAM (Gruppo Nazionale per il Calcolo Scientifico) in the year 2010.

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