Curriculum Vitae: Rossana VERMIGLIO

Vita

- Married, two children (Margherita birth year 1995 and Riccardo birth year 2001)

rofessional experience

- Full professor of Numerical Analysis, University of Udine (since September 2001)
- Associate professor of Numerical Analysis, University of Udine (1992-2001)
- Assistant professor of Numerical Analysis, University of Udine (1986-1992)
- Work Experiences at IBM and RAS Insurance Company (1984, 1985)
- Master's Degree in Mathematics cum laude at University of Trieste (1983)

Academic position

- Deputy Director of the Department of Mathematics, Computer Science and Physics (DMIF) since October 2016
- Rector's Delegate for Erasmus from a.a. 2017-18 to a.a. 2018-19.
- Member of the Commission " Abilitazione Scientifica Nazionale" 2016-2018 for A1/05 "Analisi Numerica"
- Member of Research Committee of Commissione Ricerca of DMIF since 2016
- Member of the staff ("Collegio docenti') of the Doctoral School in Mathematical Science-Computational Mathematics area of the University of Padova from 2006 until a.a. 2013-14
- Member of the staff ("Collegio docenti') of the Doctoral School in Informatics and Mathematical and Physical Science of the University of Udine from a.a. 2014-15 until a.a. 2017-18.
- Coordinator of the MIUR-Piano Lauree Scientifiche "Mathematics and Statistics" for the University of Udine until a.a. 2014-15. It is a national project for the development of knowledge of mathematics in the schools.

- Coordinator of Ersamus Exchange program with the University NTNU of Trondheim Norway
- Deputy Dean of the Faculty of Science, University of Udine (a.a. 2002-03)
- Member of the "Senato Accademico Allargato" (01.10.2009-21.06.2012)
- Member of "Commissione Pari Opportunità" (20.01.2010-04.12.2013)

Teaching

- Basic and advanced courses on Numerical Analysis for both degree courses in Mathematics and Computer Science
- Advisor of Bachelor's and Master's Thesis in Mathematics and Computer Science
- Courses for the PhD students of Doctoral School in Mathematical Science-Computational Mathematics area of the University of Padova
- Supervisor of the PhD Thesis and research grants
- Course on "Numerical Methods for Differential Equations" for the Scuola Superiore of the University of Udine. The Scuola Superiore is the school of excellence of the University of Udine.

Research The research is focused on numerical methods for evolution models described by functional equations mainly of retarded type, such as retarded functional differential equations (delay differential equations, Volterra integro-differential equations), retarded functional equations (Volterra integral equations), and partial retarded differential equations. A distinguishing feature of retarded functional equations is that the evolution depends on the past history to capture the effects of the time delay. Then they allow a better description of the real-life phenomena in several application fields such as automatic control, populations and epidemics models. An important example in population dynamics is given by the so-called Daphnia model, where the evolution of a size structured consumer is described by a Volterra functional equation coupled with the evolution of an unstructured resource described by a delay differential equation. As additional difficulties, the right-hand sides are both of integral type (continuous age distribution) and given implicitly through external ordinary differential equations. Delay models are infinite-dimensional dynamical systems and so, it is necessary to develop specific numerical techniques for time-integration and for stability and bifurcation analysis.

Accurate, reliable and efficient numerical approaches for time-integration have been proposed and analyzed. In the numerical analysis for the retarded equations, the construction of continuous approximations is a

relevant issue. Besides the convergence analysis, it is important to analyze the stability properties of the resulting methods and a particular effort has been devoted to this aim. Within this context the first step requires the specification of some test equations and the study of the qualitative behaviour of the exact solutions (contractivity, asymptotic stability). Secondly the numerical methods preserving such qualitative properties are determined. The stability properties of exact solutions have been analyzed by different approaches: the method of Lyapunov, the Laplace transform and the theory of the stability with respect to the forcing term. The latter has pointed the direction for the construction of efficient numerical methods with good stability properties.

From a dynamical system point of view the stability of equilibria can be investigated by means of long-time numerical simulations. Therefore it is important not only to propose efficient numerical methods but also to analyze when they don't introduce spurious asymptotic values. This property is called regularity and it has been studied for ordinary and delay differential equations and for different class of numerical methods.

Recently, the local stability of equilibria and periodic solutions for differential systems with both discrete and distributed delays has been addressing by alternative approaches which approximate the stability indicators directly. By the principle of linearized stability, the original problem turns into the stability of the zero solution of the linearized system. Techniques have been developed for the approximation of the characteristic roots (equilibria) or the characteristic multipliers (periodic solutions), which are based on the discretization by pseudospectral method of the infinitesimal generator or the evolution operator respectively. The eigenvalues of the resulting matrices are the sought approximations. The advantage is the well-known spectral accuracy which allows obtain very accurate approximations with small matrix dimension. Due to the efficiency of these techniques bifurcation diagrams and stability charts can be easily obtained.

An efficient adaptive algorithm for the computation of the level curves of surfaces has been proposed and applied to the determination of stability charts and of the pseudospectra for linear differential equations. Moreover a freely available Matlab package TRACE-DDE with a user graphic interface devoted to the computation of the characteristic roots and stability charts of linear autonomous systems of delay differential equations with discrete and distributed delays has been developed. It allows easy data input and results output to support the users of delay differential models in their research activity.

The infinitesimal generator approach, i.e. the pseudo-spectral dis-

cretization of the infinitesimal generator associated to solution semigroup, has revealed to be a valid and flexible approach and it has been fruitfully applied to study the asymptotic stability of equilibria and to construction of bifurcation diagrams and stability charts for differential equations of advanced-retarded or neutral type, partial differential equations with delay, age-structured population and epidemics models and Volterra functional equations coupled with delay differential equations. The approach has been recently extended to nonlinear delay models. The aim is to derive ordinary differential equations and to investigate the stability and bifurcation of equilibria of the original model by available software packages for continuation and bifurcation for ordinary differential equations. Theoretical and numerical results confirm the effectiveness and the versatility of the approach, opening a new perspective for the bifurcation analysis of delay equations, in particular coupled renewal and delay differential equations, also with infinite delay.

As widely known, the basic reproduction number plays a key role in weighing birth/infection and death/recovery processes in several models of population dynamics. In this general setting, it is defined as the spectral radius of next generation operator and its practical determination requires suitable numerical methods. The problem has been addressed by reducing the relevant operators to matrices through a pseudospectral collocation, and by solving finite-dimensional eigenvalue problems.

Abstract delay differential equations (ADDEs) extend DDEs from finite to infinite dimension. In this case the stability analysis of an equilibrium is described by the position in the complex plane of the essential and the non-essential spectra of the infinitesimal generator of the corresponding linearized system. The infinitesimal generator approach has been also extended to approximate the non-essential spectrum of linear ADDEs and then applied to a homogeneous neural field model with transmission delay of a single population of neurons.

The pseudo-spectral method has been also proposed for the efficient description of the carrier quantization in nanoscale in nanoscale MOSFETs, modelled by Schrödinger-Poisson equations.

Besides the numerical methods, another important aspect to take into account in practical applications is the specification of a set of data (initial conditions, model constants and parameters). The inherent variability and the epistemic uncertainty in the model constants represent sources of data errors, which are ubiquitous in applications and are often modelled by random variable in a suitable probabilistic framework. My recent interest includes also delay differential equa-

tions with uncertain parameters and the Polynomial Chaos theory of Wiener for the quantification of the effect of the data uncertainty on the stability of equilibria. In this context we have also investigated the non-intrusive spectral projection approach based on so called the Padua points and the PC-based methods for Global Sensitivity Analysis. Moreover the PC methods have been extended for the sensitivity analysis of the basic reproduction number in population dynamics.

The double discrete Legendre-Fenchel Transform to approximate the convex envelope of a given function has been analyzed and applied to the study of phase separation in non-ideal ionic solutions.

Finally parallel algorithms have been proposed for the approximation of solutions of ordinary differential equations and efficient algorithms for the computation of contour maps.

- *Author and co-author* of papers on international journals with referees, chapters in books and conference papers (peer-reviewed).
- *Speaker* at several international conferences.
  Some selected invited/contributed talks:
  - 11^{th} Conference on "Dynamical Systems Applied to Biology and Natural Science" February 4–7, 2020, Trento (IT) "Numerical analysis of the basic reproduction number for structured population models"
  - STRUCTAPP2020 "A two-day workshop on structure-preserving approximation of evolutive problems and applications". January 23–24, 2020 L'Aquila (IT) "Numerical analysis of the basic reproduction number for structured population models"
  - Workshop on Numerical Solution of Integral and Differential Equations (NSIDE 2019) July 17-19, 2019. Gdansk (PL) "Numerical analysis of the basic reproduction number in population models"
  - 10th International Conference on Dynamical Systems Applied to Biology and Natural Sciences (DSABNS 2019) February 3-6, 2019. Naples (IT) "PC-based sensitivity analysis of the basic reproduction number of population and epidemic models"
  - Mathematics for BioMedicine (MathBioMed) October 8-11, 2018. Rome (IT). "Numerical bifurcation of delay equations via pseudospectral discretization of abstract differential equations"
  - Biomathematics Seminars series University of Helsinki. September 19-26, 2018. Helsinki (FI). "Polynomial chaos expansions and stability of linear uncertain delay differential equations: a numerical approach for uncertainty and sensitivity analysis
  - 11th European Conference on Mathematical and Theoretical Biology (ECMTB 2018) July 23–27, 2018. Lisbon (Portugal) "Polynomial chaos expansions and stability of uncertain delay differential equations"
  - 9th International Conference on Dynamical Systems Applied to Biology and Natural Sciences (DSABNS 2018) February 7-9, 2018. Torino (IT). "New prospects for numerical bifurcation of nonlinear delay equations"
  - International Conference on Scientific Computation and Differential Equations 2017 (SciCADE) September 11-15, 2017. Bath (UK) "PseudoSpectral Discretization for Abstract Differential Equations"

* 1st Workshop on Delays and Constrains in Distributed parameter systems 2017 (DECOD 2017) November 22-24, 2017, Gif-suf-Yvette (FR) " Stability of Uncertain Delay Differential Equations"
* Workshop on Stability and Discretization Issues in DiFFerential Equations (SDIDE2016) June 20-24, 2016. Trieste (IT) "Approximating the dynamics of delay models by pseudospectral methods: the nonlinear case for delay differential equations".
* XX Congresso Unione Matematica Italiana, September 7-12, 2015 Siena (IT) "The stability analysis of delay differential equations with uncertain parameters"
* The Fields Institute for Research in Mathematical Sciences-Short Thematic Program on Delay Differential Equations: Structured Delay Systems. May 19-22, 2015. Toronto (CA) "Structured populations: back to ODEs for nonlinear models"
* Advanced in Numerical Analysis and Applications. March 30-31, 2015. Torino (IT) "The IG-approach for nonlinear delay and delay differential equations: back to ordinary differential equations".
* International Conference on SCIentific Computation And Differential Equations (SciCADE2015) September 14-18, 2015. Potsdam (DE) "The pseudospectral approach for nonlinear delay models: back to ODEs"
* The Department of Mathematics and Statistics University of Helsinki. November 5, 2014 Helsinki (FI) "Numerical stability of linear Delay Equations/Delay Differential Equations with application to the Daphnia models".
* Structural Dynamical Systems: Computational Aspects (SDS2014) June 10-13, 2014. Capitolo-Monopoli, Bari (IT) "Numerical stability analysis of Delay Differential Equations with uncertain data"
* Department of Mathematics, University of Utrecht. February 26, 2013. Utrecht (NL) "Polynomial Chaos decomposition and stability analysis of uncertain Delay Differential Equations"
* SciCADE2013-International Conference on SCIentific Computation And Differential Equations. September 16-20, 2013. Valladolid (ES) "Polynomial Chaos expansions and stability analysis of Uncertain Delay Differential Equations".
* NDNS symposium on Delay Equations Department of Mathematics, University of Utrecht, March 2, 2012. Utrecht (NL) "Numerical stability of delay equations".
* Recent trends in delay differential equations: models, theory and numerics. June 4-8, 2012. Cortona (IT): "Numerical stability of equilibria of delay equations by the IG approach".
* ICIAM 2011-International Congress on Industrial & Applied Mathematics July 18 -22, 2011. Vancouver (CA) "Numerical simulation of Volterra functional equations with delay"
* TBA2009-International workshop Trends in Bifurcation Analysis: Methods and Applications. June 3-5, 2009. Milano (IT) "Numerical stability analysis of infinite-dimensional dynamical systems"
* SDIDE08-Workshop on Stability and Discretization Issues in DiFFerential Equations. September 17-20, 2008. Vienna (AT) "Numerical stability of Partial Retarded Functional Differential Equations"
* Seminar on Numerical Analysis and Geometric Integration. June 13, 2008. Ljubljana (SI) "Numerical approximation of characteristic values of Partial Retarded Functional Differential Equations".

* International Conference on SCIentific Computation And Differential Equations (SciCADE2007) July 9 -13, 2007. St. Malo' (FR) "Numerical approximation of characteristic values of Partial Retarded Functional Differential Equations".
* CRM-AARMS Workshop on Recent Advances in Functional and Delay Differential Equations: November 1-5, 2007. Halifax, Nova Scotia (CA) "Numerical approximation of characteristic values of Partial Retarded Functional Differential Equations".
* 8th Colloquium on the Qualitative Theory of Differential Equations. June 25-28, 2007. Szeged, (HU)"Numerical approximation of characteristic values of Partial Retarded Functional Differential Equations: part 1."

– Local coordinator/member of *National Research Projects*:
  * MURST-COFIN97 Project: "Analisi Numerica: Metodi e software matematico", recipient of local grant for the project "Metodi numerici per equazioni differenziali ordinarie e funzionali";
  * GNIM Project: "Metodi numerici per le equazioni differenziali ordinarie e applicazioni"
  * MURST-COFIN99 Project: "Metodi Numerici per problemi di evoluzione"
  * GNCS 2002 Project: "Problematiche di interfacciamento tra metodologie numeriche per le equazioni differenziali ordinarie ed equazioni alle derivate parziali" (prof. Canuto);
  * INDAM 2003 Project: "Metodi e modelli matematici della dinamica di popolazione su equazioni di evoluzione" (prof. Iannelli)
  * INDAM 2004 Project: "Integrazione di sistemi complessi in biomedicina: modelli, simulazione, rappresentazione"(prof. Quarteroni)
  * PRIN 2007 Project: recipient of local grant for the project "Stabilit numerica di sistemi dinamici descritti da equazioni differenziali funzionali di tipo ritardato e modelli di popolazione"
  * GNCS 2010 Project:"Metodi numerici e stabilit di equazioni differenziali funzionali" (prof. Zennaro)
  * GNCS 2011 Project: "Simulazione numerica di equazioni integrali funzionali di Volterra con ritardo con applicazioni ai modelli di dinamica di popolazione" (prof. Vermiglio)
  * GNCS 2013 Project: "Metodi numerici per sistemi evolutivi: equazioni funzionali infinito dimensionali ed equazioni differenziali discontinue" (prof. Guglielmi)
  * GNCS 2014 Project: "Analisi numerica di problemi differenziali infinito-dimensionali e discontinui" (prof. Guglielmi)
  * GNCS 2015 Project: "Analisi numerica di sistemi dinamici infinito-dimensionali e non regolari" (prof. Guglielmi)
  * GNCS 2016 Project: "Metodi numerici per equazioni di evoluzione infinito dimensionale e non smooth" (prof. Maset)

– *Visiting periods* University of Utrecht, prof. O. Diekmann (2016); Univeristy of Helsinki, prof. M. Gyllenberg (2014, 2018); CERMICS (FR) prof A. Ern (2012); University of Utrecht (NL) prof. O. Diekmann (2012,2013); University of Manchester (GB) prof. C.TH. Baker (1999/1990); University of Tempe, Arizona (USA), prof. Z. Jackiewicz .

– invited member of the PhD committee for the defense of the thesis "On symplectic integration in Lie groups and manifolds" by Hkon Martinsen NTNU Trondheim (Norway, Nov. 2014) , and the thesis "Pseudospectral methods and numerical continuation for the analysis of structured population models" by Julia Sánchez Sanz, supervisor: Philipp Getto Univeristy of Bilbao (Spain, June 2016).

– *Organizational activities:* visiting professors (prof. G.Mastroianni (2019) prof. A. Ern (2016,2015, 2013, 2011); prof. O. Diekmann (2010); prof. B. Krauskopf (2010); prof. G. Stepan (2006); prof. E. Hairer (2003); prof. H. Brunner (2001); prof. Z. Jackiewicz; prof. V. Kolmanovskii); committee of conference and sessions ("one-day Workshop on Semigroup and Evolution" Udine, Italy, 2010,"wANPE08: Workshop on Analysis and Numerics of Population dynamics and Epidemics models" Udine, Italy (2008), "Innovative Methods for Solving Evolutionary Problems with Memory" Capri, Italy (2006), SciCade17, SciCADE97, IFAC-TDS2010 Prague ,2010, International Design Engineering Technical Conferences &Computers and Information In Engineering Conference DETC05 (2005), CRM-AARMS Workshop on Recent Advances in Functional and Delay Differential Equations (Halifax, Nova Scotia, Canada, 2007), ICIAM 2011, Vancouver, Canada 2011, Recent Trends in delay differential equations: models, theory and numerics (Cortona, Italy 2012).Conference on Decision and Control CDC05, International Federation of Automatic Control Time Delay Systems IFAC -TDS07); referee for international journals (JCAM, BIT, SINUM, SISC, Numerische Mathematik, IMA Journal of Numerical Analysis, IMA Journal of Mathematical Analysis and Applications, Applied Numerical Mathematics, Mathematics of Computation, Numerical Applied Mathematics, Computing, Computers and Mathematics With Applications, Mathematical Review, Mathematics and Computers in Simulation, Numerical Methods for Partial Differential Equations, International Journal of Dynamics and Control, IEEE-TAC); referee for international conferences ("The International Conference on the Numerical Solution of Volterra and Delay Equations" (1990), International Design Engineering Technical Conferences & Computers and Information In Engineering Conference DETC05, Conference on Decision and Control CDC05, International Federation of Automatic Control Time Delay Systems IFAC -TDS07, IFAC -TDS09)

Pubblications

– D. Breda, J. Ripoll, R. Vermiglio Collocation of next-generation operators for computing the basic reproduction number of structured populations. In preparation.

– Francesca Scarabel, Dimitri Breda, Odo Diekmann, Mats Gyllenberg, Rossana Vermiglio Numerical bifurcation analysis of physiologically structured population models via pseu-

dospectral approximation. Special issue on Scientific Computing. Submitted to Vietnam Journal of Mathematics.

– D. Breda, F. Florian, J. Ripoll, R. Vermiglio Efficient numerical computation of the basic reproduction number for structured populations. Special Issue DSABNS2019. Submitted to International Journal of Nonlinear Sciences and Numerical Simulation (IJNSNS).

– Odo Diekmann, Francesca Scarabel and Rossana Vermiglio Pseudospectral discretization of delay differential equations in sun-star formulations: results and conjectures. Special Issue "Delay Differential Equations: Theory, Applications and New Trends" Accepted for publication on DCDS-S (2019)

– F. Florian and R.Vermiglio PC-based sensitivity analysis of the basic reproduction number of population and epidemic models. Contribution accepted for publication on the book "Current Trends in Dynamical Systems in Biology and Natural Sciences" Editor(s): Maira Aguiar (Trento), Carlos Braumann (Evora) Bob Kooi (Amsterdam) Andrea Pugliese (Trento) Nico Stollenwerk (Lisbon) Ezio Venturino (Torino) (2019)

– Alessia Andó, Dimitri Breda, Davide Liessi, Stefano Maset, Francesca Scarabel and Rossana Vermiglio: 15 years or so of pseudospectral collocation methods for stability and bifurcation of delay equations. Special Issue "Incorporating constraints on the Analysis of Delay and Distributed Parameter Systems. Accepted for publication on on Advances on Delays and Dynamics at Springer.

– R. Vermiglio, A. Zamolo: Sensitivity analysis for stability of uncertain delay differential equations using polynomial chaos expansions. Special Issue "Incorporating constraints on the Analysis of Delay and Distributed Parameter Systems Accepted for publication on Advances on Delays and Dynamics at Springer.

– Mats Gyllenberg, Francesca Scarabel, Rossana Vermiglio: Equations with infinite delay: Numerical bifurcation analysis via pseudospectral discretization. Applied Mathematics and Computation 333 (2018) 490505.

– R. Vermiglio Polynomial Chaos expansions for the stability analysis of uncertain delay differential equations. SIAM/ASA J. UNCERTAINTY QUANTIFICATION Vol. 5, pp. 278-303 (2017)

– D. Breda; O. Diekmann; M.Gyllenberg; F. Scarabel; and R.Vermiglio *Pseudospectral discretization of nonlinear delay equations: new prospects for numerical bifurcation analysis.*

SIAM Journal on Applied Dynamical Systems 15-1, pp. 1–23 (2016)

– R . Vermiglio *Numerical approximation of the non-essential spectrum of abstract delay differential equations.* Mathematics and Computers in Simulation, vol. 125, pp. 56–69 (2016).

– D. Breda, S. Maset, and R. Vermiglio *Stability of Linear Delay Differential Equations. A Numerical Approach with MATLAB.* SpringerBriefs in Electrical and Computer Engineering (2015)

– D. Breda, P. Getto; J. Sanchez Sanz; and R. Vermiglio *Computing the eigenvalues of realistic Daphnia models by pseudospectral methods* SIAM Journal on Scientific Computing, vol. 37 (6), pp. 2607–2629 (2015).

– L. Contento; A. Ern; and R. Vermiglio *An efficient algorithm for the double Legendre–Fenchel transform with application to phase separation.* Computational Optimization and Applications 60 (1), pp. 231–261 (2015).

– D. Breda, S. Maset, and R. Vermiglio *Pseudospectral methods for stability analysis of delayed dynamical systems*, International Journal of Dynamics and Control, vol. 2 (2), pp. 143–153 (2014).

– D. Breda, O. Diekmann, S. Maset, and R. Vermiglio *A numerical approach to investigate the stability of equilibria for structured population models* Journal of Mathematical Biology, vol. 7(1), pp. 4–20 (2013).

– D. Breda, S. Maset, and R. Vermiglio *Approximation of Eigenvalues of Evolution Operators for Linear Retarded Functional Differential Equations*, SIAM J. Num. Anal., vol. 50 (3), pp. 1456–1483 (2012).

– D. Breda, S. Maset, and R. Vermiglio *Computing eigenvalues of Gurtin-MacCamy models with diffusion*, IMA J. Num. Anal., vol. 32, pp. 1030–1050 (2012) .

– D. Breda, S. Maset, and R. Vermiglio *Numerical recipes for investigating endemic equilibria of age-structured SIR epidemics*, Discrete and Continuous Dynamical Systems, vol. 32(8), pp. 2675–2699 (2012).

– D. Breda, D. Diekmann, W.F. de Graaf, A. Pugliese A, and R. Vermiglio*On the formulation of epidemic models (an appraisal of Kermack and McKendrick)* Journal of Biological Dynamics,vol. 6, pp. 103–117 (2012).

– D. Breda, D. Esseni, A. Paussa, R . Specogna F. Trevisan, and R. Vermiglio *Comparison between Pseudospectral and Discrete Geometric Methods for Modelling Quantization Effects in Nanoscale Electron Devices*, IEEE Transactions on Magnetics, vol. 48,pp. 203–206 (2012).

– D. Breda, S. Maset, and R. Vermiglio *Discretization of solution operators for linear time invariant - Time delay systems in Hilbert spaces*, in Time Delay Systems: Methods, Applications and New Trends, Lecture Notes in Control and Information Sciences, vol.423, pp. 217–228 (2012).

– D. Breda, D. Esseni, A. Paussa, R . Specogna F. Trevisan, and R. Vermiglio *Comparison between Pseudospectral and Discrete Geometric Methods for Modelling Quantization Effects in Nanoscale Electron Devices*, Proceedings COMPUMAG (2011).

– I. Mazzer, and R. Vermiglio*An age-structured population dynamics model for several species with finite life-span*, Research Report DIMI University of Udine, pp. 1–20 (2011).

– D. Breda, S. Maset, and R. Vermiglio *Computation of asymptotic stability for a class of partial differential equations with delay*, Journal of Vibrations and Control, vol. 16, pp. 1005–10022 (2010).

– D. Breda, S. Maset, and R. Vermiglio *On discretizing the semigroup of solution operators for linear time invariant time delay systems*, Proceedings IFAC-TDS (2010).

– A. Paussa, F. Conzatti, D. Breda, R. Vermiglio, D. Esseni, and P. Palestri, *Pseudo-spectral methods for the efficient simulation of quantization effects in nanoscale MOS transistors*, IEEE Transections on Electron Devises, vol. 57(12), pp. 3239–3249 (2010).

– A. Paussa, F. Conzatti, D. Breda, R. Vermiglio, D. Esseni, and P. Palestri, *Pseudo-spectral methods for the efficient simulation of quantization effects in nanoscale MOS transistors* Proceedings SISPAD (2010).

– D. Breda, S. Maset, and R. Vermiglio, *An adaptive algorithm for efficient computation of level curves of surfaces*, Numerical Algorithms, 52(4),pp. 605–628 (2009).

– D. Breda, S. Maset, and R. Vermiglio, *Numerical approximation of characteristic values of partial retarded functional differential equations*, Numer. Math., Vol. 113(2), pp. 181–242 (2009).

– D. Breda, S. Maset, and R. Vermiglio, *TRACE-DDE: a Tool for Robust Analysis and Characteristic Equations for Delay Differential Equations.*, Lecture notes in Control and Information Sciences. vol 388, Topics in Time-Delay Systems: Analysis, Algorithms and Control, J.J. Loiseau, W. Michiels, S.-I. Niculescu, R. Sipahi eds., Springer, New York, pp. 145–156 (2009).

– D. Breda, M. Iannelli, S. Maset, and R. Vermiglio, Stability analysis of the Gurtin-MacCamy model, SIAM Journal on Numerical Analysis, vol. 46 (2), pp. 980–995 (2008).

– D. Breda, S. Maset, and R. Vermiglio, *Computing the characteristic values of partial retarded functional differential equations*, Proceedings ICIAM (2007).

– D. Breda, C. Cusulin, M. Iannelli, S. Maset, and R. Vermiglio, *Stability analysis of age-structured population equations by pseudospectral differencing methods*, Journal of Mathematical Biology, vol. 54, pp. 701–720 (2007).

– D. Breda, S. Maset, and R. Vermiglio, *Pseudospectral approximation of eigenvalues of derivative operators with non-local boundary conditions*, Applied Numerical Mathematics, vol.56 (3-4) , pp. 318-331 (2006).

– D. Breda, S. Maset, and R. Vermiglio, *Numerical computation of characteristic multipliers for linear time periodic delay differential equations*, Proceedings IFAC-TDS (2006).

– D. Breda, S. Maset, and R. Vermiglio, *Pseudospectral differencing methods for characteristic roots of delay differential equations*, SIAM J. Sci. Comput., vol. 27, pp. 482–495 (2005).

– S. Maset, L. Torelli and R. Vermiglio *Runge-Kutta methods for Retarded Functional Differential equations* Mathematical Models and Methods in Applied Sciences, vol. 15, pp. 1203–1251 (2005).

– D. Breda, S. Maset, and R. Vermiglio, *Pseudospectral techniques for stability computation of linear time delay systems*, Proceedings CDC-ECC (2005).

– D. Breda, S. Maset, and R. Vermiglio, *Computing the characteristic roots for delay differential equations*, IMA Journal of Numerical Analysis, vol. 24, pp. 1–19 (2004).

– D. Breda, S. Maset, and R. Vermiglio, *Methods for numerical computation of characteristic roots for delay differential equations: experimental comparison*, Sci. Math. Jpn., vol 58(2), pp. 377–388, (2003).

– L. Torelli, and R. Vermiglio, *A Numerical Approach for Implicit Non-linear Neutral Delay Differential Equations and its Stability Analysis*, BIT, vol. 43(1), pp. 195–215 (2003).

– H. Brunner, and R. Vermiglio, *Stability of solutions of delay functional integro-differential equations and their discretizations*, Computing, vol. 71(3), pp. 229–245 (2003).

– Z. Jackiewicz, and R. Vermiglio, *Order conditions for partitioned Runge-Kutta Methods*, Applications of Mathematics, vol. 45(4), pp. 301–316 (2000).

– D. Siega, and R. Vermiglio, *High order robust method for the integration of rapid oscillatory functions*, Research Report RR/UDMI/16/00 University of Udine (2000)

– R. Vermiglio, *On the computation of the joint spectral radius: numerical experiments* Research Report RR/UDMI/21/99, University of Udine (1999).

– Z. Jackiewicz, R. Vermiglio, and M. Zennaro, *Regularity properties of multistage integration methods*, Journal of Computational and Applied Mathematics, vol. 87, pp. 285–302 (1997).

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– Z. Jackiewicz, and R. Vermiglio, *General Linear Methods with external stages of different orders*, BIT, vol. 36(4), pp. 688–712 (1996).

– Z. Jackiewicz, R. Vermiglio, and M. Zennaro, Regularity properties of Runge-Kutta methods for ordinary differential equations, Applied Numerical Mathematics, vol. 22, pp. 251–262 (1996).

– A. Bellen, and R. Vermiglio, *Some Applications of Continuous Runge-Kutta Methods*, Applied Numerical Mathematics, vol. 24, pp. 63–80(1996).

– A. Bellen, V. Kolmanovskii, L. Torelli, and R. Vermiglio, *About stability of some functional differential equations of neutral type*, Journal of Mathematical Analysis and Applications, vol. 189 ,pp. 59–84 (1995).

– Z.Jackiewicz, R. Vermiglio, and M. Zennaro, Variable stepsize diagonally implicit multistage integration methods for ordinary differential equations, Applied Numerical Mathematics, vol. 16, pp. 343–367 (1995) .

- L. Torelli, V. Kolmanovskii, and R. Vermiglio, *Stability of some test equations with delay*, SIAM J.Math.Anal., vol 25(3), pp. 948–961(1994).
- R. Vermiglio, and M. Zennaro, *Multistep natural continuous extensions of Runge-Kutta methods: the potential for stable interpolation*, Applied Numerical Mathematics, vol.12, pp. 521–546 (1993).
- R. Vermiglio, *Multistep high order interpolants of Runge-Kutta methods*, Journal of Computational and Applied Mathematics,vol. 45, pp. 75–88 (1993).
- L. Torelli, and R. Vermiglio, *On the stability of continuous quadrature rules for differential equations with several constant delays*, IMA Journal of Numerical Analysis, vol. 2(13), pp. 291–302 (1993).
- R. Vermiglio, *On the stability of Runge-Kutta methods for delay integral equations*, Numerische Mathematik, vol. 61 pp. 561–577, (1992).
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