12-th Symposium on “Recent Trends in the Numerical Solution of Differential Equations”: Preface

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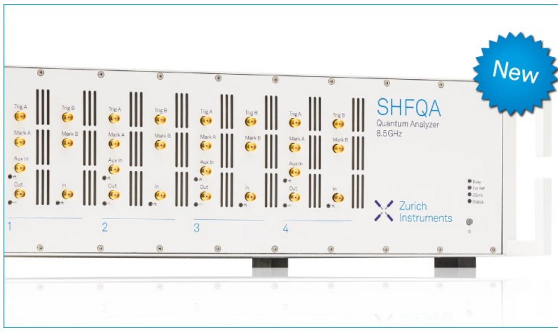

12-th Symposium on “Recent Trends in the Numerical Solution of Differential Equations”: Preface

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As in the previous editions [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11], the symposium covers various topics related to the numerical solution of differential equations. The list of papers, in alphabetical order of the respective speakers, including a short description of each contribution, is given below.

Paper 1, by P. Amodio, L. Brugnano, F. Iavernaro, and C. Magherini, concerns the use of energy conserving HBVMs as spectral methods in time. Such methods have proved to be very effective for the efficient numerical solution of Hamiltonian (both ODE and PDE) problems. Moreover, their use as spectral methods in time opens new perspectives, as *general purpose* ODE solvers.

Paper 2, by A.S. Eremin, A.R. Humphries, and A.A. Lobaskin, studies the practical problems which one faces when numerically solving (possibly neutral) delay differential equations (DDEs). A numerical code, implementing strategies for managing such problems, is presented, and compared with an exiting Matlab code for DDEs. The numerical tests confirm the advantage of the used strategies.

Paper 3, by C.I. Gheorghiu, deals with the definition of numerical methods for solving nonlinear singular ODE-BVPs. Such methods are based on the use of orthogonal polynomials which, however, are orthogonal with respect to more sophisticated measures, and are aimed at providing corresponding differentiation matrices with good properties.

Paper 4, by Y. Komori, A. Eremin and K. Burrage focuses on the mean square stability analysis of stochastic orthogonal Runge-Kutta-Chebyshev (SROCK) methods. The analysis is based on the usual test equation modelling a stochastic ODE problem with delay. The results prove that SROCK methods have much better stability properties than the usual Euler-Maruyama method.

Paper 5, by F.L. Romeo, studies a new high-order semi-implicit staggered space-time Discontinuous Galerkin method on unstructured grids of two-dimensional domains, for the simulation of viscous incompressible flows. The designed scheme is of the Arbitrary Lagrangian Eulerian type, which is suitable to work on fixed as well as on moving meshes.

Paper 6, by V.A. Rukavishnikov and E.I. Rukavishnikova, consider a finite element method with a special graded or refined mesh, for the Dirichlet problem with degeneration on the entire boundary of a two-dimensional domain. A comparative numerical analysis of the proposed method with the classical FEM on quasi-uniform grids is carried out.

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REFERENCES

1. L. Brugnano. *AIP Conf. Proc.* **1048**, 861 (2008); doi: 10.1063/1.2991067
2. L. Brugnano. *AIP Conf. Proc.* **1168**, 705 (2009); doi: 10.1063/1.3241563
3. L. Brugnano, E. Weinmüller. *AIP Conf. Proc.* **1281**, 199 (2010); doi: 10.1063/1.3498331
4. L. Brugnano, E. Weinmüller. *AIP Conf. Proc.* **1389**, 215 (2011); doi: 10.1063/1.3636705
5. L. Brugnano, E. Weinmüller. *AIP Conf. Proc.* **1479**, 224 (2012); doi: 10.1063/1.4756103
6. L. Brugnano, E. Weinmüller. *AIP Conf. Proc.* **1558**, 732 (2013); doi: 10.1063/1.4825597
7. L. Brugnano, E. Weinmüller. *AIP Conf. Proc.* **1648**, 150001 (2015); doi: 10.1063/1.4912431
8. L. Brugnano, E. Weinmüller. *AIP Conf. Proc.* **1738**, 100001 (2016); doi: 10.1063/1.4951862
9. L. Brugnano, E. Weinmüller. *AIP Conf. Proc.* **1863**, 160001 (2017); doi: 10.1063/1.4992335
10. L. Brugnano, E. Weinmüller. *AIP Conf. Proc.* **1978**, 120001 (2018); doi: 10.1063/1.5043766
11. L. Brugnano, E. Weinmüller. *AIP Conf. Proc.* **2116**, 140001 (2019); doi: 10.1063/1.5114128

Luigi Brugnano

Luigi Brugnano is professor of numerical analysis at the University of Firenze, Italy. In 1985, he graduated ‘magna cum laude’ at the University of Bari, Italy, where he started his scientific career, under the guidance of professor Donato Trigiante. In 1990, he became lecturer at that university. In 1992, Luigi Brugnano moved to the University of Firenze as an associate professor and, in 2001, he became full professor. His scientific interests have focused on several topics, such as numerical linear algebra, numerical methods for polynomial roots, numerical methods for differential equations, parallel computing, numerical software, and mathematical modelling. Recently, he is actively involved in the field of the so-called *Geometric Integration*. He is the author of more than a hundred scientific publications, and six monographs (including two research monographs).

Ewa Weinmüller

Ewa B. Weinmüller has been a member of the Analysis and Scientific Computing Department at the Vienna University of Technology since 1975. She studied mechanical engineering at the University of Technology in Poznan, Poland, and obtained her MSc degree in 1974. After moving to Austria in 1975 she continued her studies in technical mathematics and physics at the University of Vienna and Vienna University of Technology and completed them in 1979 with a PhD degree advised by Hans J. Stetter. In 1987/88, she was a visiting professor at the Simon Fraser University in Burnaby BC, and in 1996 at the Imperial College in London. Since 2004 she is the coordinator and spokeswoman of the Research Unit "Numerics and Simulation of Differential Equations". Her research interests are analysis and numerical treatment of ordinary differential equations with singularities, especially a posteriori error estimates, defect correction algorithms, mesh adaptivity in the context of boundary value problems in ordinary differential equations and differential-algebraic equations, and software development in Matlab. She is the author and co-author of more than a hundred scientific publications.