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Curriculum vitae

Name: Elena Celledoni

Current post: Professor at NTNU

Affiliation: Department of Mathematical Sciences NTNU
Trondheim, Norway

Date of birth: 9th September, 1967

Languages: Italian, English, Norwegian

Academic education:

B.A. in Mathematics (University of Trieste)

Ph.D. in Computational Mathematics (University of Padova)

Career:

2001-2004 Research scientist at SINTEF (Norwegian Foundation for Science and Technology) in the Applied Mathematics Department

2002-2003 Research fellow at the Center for Advanced Study, Oslo, (fellowship from the University of Bergen).

1999-2001 Post-doc in Numerical Analysis, NTNU Trondheim

1998-99: Post-doc in Numerical Analysis, Mathematical Science Research Institute, Berkeley (CA)

1997-98: Post-doc in Numerical Analysis, DAMTP Cambridge

Invited plenary talks and lectures.

Geometric Numerical Integration, March 2006, Oberwolfach, Germany. (Organizers: E. Hairer, M. Hochbruck, A. Iserles, C. Lubich).

Differential Algebraic Equations, April 2006, Oberwolfach, Germany. (Organizers: S. Campbell, R. Mertz, L. Petzold, P. Rentrop).

Structural Dynamical Systems Workshop, June 2006, Capitolo/Bari, Italy. (Organizers: N. Del Buono, C. Elia, L. Lopez, T. Politi).

Conference on Geometric Integration, September 2006, Castellon, Spain. (Organizers: F.Casas, S. Blanes).

ICMS Workshop: Applying Geometric Integrators, April 2007, Edinburgh, UK. (Organizers: R. McLachlan and B. Leimkuhler).

Newton Institute Workshop, Effective Computational Methods for Highly Oscillatory Problems: The Interplay between Mathematical Theory and Applications, July 2007, Cambridge, UK. (Organizers: Tom Hou, A. Iserles, B. Leimkuhler, C. Lubich).

COCO 2010 Combinatorics and Control, Consejo Superior de Investigaciones Cientificas, April 2010, Madrid, Spain.

COCO 2010 Combinatorics and Control, Conference La Cristalera, Miraflores de la Sierra, Universidad Autonoma de Madrid, June 2010.

BIRS Workshop on New numeric and geometric tools for the analysis of differential equations, August 2010, Banff International Research Station, Canada. Organized by G. Reid, E. Mansfield, J. Tuomela, A. Sommese.

Workshop in GI Oberwolfach March 2011.

Projects.

2011 CRiSP Collaborative Research in Structure Preservation, IRSES project EU 7th Framework Program. Project leader.

2009 GeNuIn Applications, project funded by the Norwegian Research Council (4 million NOK). Project leader.

Organization of conferences and schools.

2011 Minisymposium at ICIAM 2011. Algebraic and geometric structures in numerical analysis. Co-organized by Hans Munthe-Kaas and Simon Malham.

2009 Special Interest Group in Geometric numerical methods in Mechanics and Control. Funded by the faculty of Computer Science, Mathematics and Electrical Engineering, NTNU.

2005 Organization of **SIMS2005**, nordic conference on simulation and modelling.

2003 and **1997** I participated to the organisation of **SciCADE 2003** and **SciCADE 1997**.

2002 Summer school in Geometric Integration, Fevik. This school attracted participants from all over the world, and marked the beginning of the special year in Geometric Integration held at Centre for Advanced Study (Oslo) in 2002-2003.

1998-2011 MAGIC I co-organize this annual meeting in collaboration with A. Zanna, H. Munthe-Kaas and B. Owren. The main goal of this event is the education of PhD students.

Evaluation work.

2011 and **2007** I was appointed as an evaluator for a professorship and a lecturship in Numerical Analysis at KTH Stockholm.

2003- 2010 I was appointed as evaluator for the EU commission in the 6th and 7th Framework program.

2004 I was appointed as an evaluator for a lectureship in Applied Mathematics at Agder University College, Norway.

2003 I was member of the evaluation committee for PhD thesis at the University of Bergen and at NTNU.

Supervision of master students.

I supervised students at master level (Industrial Mathematics, at the Department of Mathematical Sciences, NTNU, Trondheim): **Geir Johannesen** (parallel methods), **Christina Myrvold** (discretization of PDEs), **Dag Frode Evensberget** (numerical geometric mechanics), **Eivind Fonn** (analysis of shapes by geodesic flows), **Sindre Hilden** (numerical integrators for nonholonomic mechanics), **Einar Gustavsson** (numerical linear algebra). **Eirik Hoel Høiseth** (numerical integrators for nonholonomic mechanics).

Supervision of PhD students.

Niklas Sävström graduated in December 2009. His PhD thesis focusses on geometric methods for rigid body and rod dynamics.

Bawfeh Kingsley Kometa, since August 2007. His project focusses on semi-Lagrangian methods for convection dominated problems. Graduation November 2011.

Nataliya Ramzina, since August 2010. Her project focusses on mechanical systems of interest in offshore engineering.

Eirik Hoel Høiseth, since September 2011. His project focusses on nonholonomic mechanical systems.

Administrative work.

Member of the Computational Science and Visualization group, faculty of Computer Science, Mathematics and Electrical Engineering, NTNU.

Member of the Department council (Instituttssråd vararepresentant), 2006-2009.

Representative of the Department of Mathematical Sciences (NTNU) at the Norwegian Mathematical council. (Norskmatematikkråd).

Other responsibilities.

Member of the e-Infrastructure opportunity panel appointed by the Research Council of Norway.

Member of the board of Uninett Sigma (Norway) - Company administrating the resources of high performance computing in Norway.

Scientific work.

References

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- [2] E. Celledoni, *Discrete QMR and BCG in the numerical solution of linear systems of ODEs*, J. CAM 91, pp. 159–177, 1998.
- [3] E. Celledoni and A. Iserles, *Approximating the matrix exponential from a Lie algebra to a Lie group*, Math. Comp. 69, pp. 1457–1480, 2000.
- [4] E. Celledoni and A. Iserles, *Methods for the approximation of the matrix exponential in a Lie-algebraic setting*, IMA Journal of Numerical Analysis, Vol. 21, pp. 463–488, 2001.
- [5] E. Celledoni, A. Iserles and S. P. Nørsett and B. Orel, *Complexity theory for Lie-group solvers*, Journal of Complexity, Vol. 18, pp. 242–286, 2002.
- [6] E. Celledoni and B. Owren, *Lie group methods for rigid body dynamics and time integration on manifolds*, Comput. meth. in Appl. Mech. and Engrg. Vol 19, pp. 421–438, 2003.
- [7] E. Celledoni, *Isospectral discretizations of the KdV equation*, Journal of Physics A: Mathematical and General 34, pp. 2205–2214, 2001.
- [8] E. Celledoni and B. Owren, *A class of low complexity intrinsic ODE solvers for the orthogonal Stiefel manifold*, SIAM J. on Num. Anal., Vol. 21, pp. 463–488, 2001.
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- [10] E. Celledoni, A. Marthinsen and B. Owren, *Commutator free Lie group methods*, Future Generation Computer Systems, Vol. 19/3, pp. 341–352, 2003.
- [11] E. Celledoni and S. Fiori, *Neural Learning by Geometric Integration of Reduced ‘Rigid-Body’ Equations*, J. CAM, 172, pp. 247–269, 2004.
- [12] E. Celledoni, *Eulerian and Semi-Lagrangian schemes based on commutator free exponential integrators*, CRM Proc. Lecture Notes, 39, pp. 77–90, Amer Math. Soc., Providence, RI, 2005.
- [13] E. Celledoni and N. Säfström, *Efficient time-symmetric simulation of torqued rigid bodies using Jacobi elliptic functions*, J. Phys. A, 39/19, pp. 5463–5478, 2006.
- [14] E. Celledoni and N. Säfström, *A symmetric splitting method for rigid body dynamics*, Model. Identif. Control, 27, no. 2, pp. 95–108, 2006.
- [15] E. Celledoni and S. Fiori, *Descent methods for optimization on homogenous manifolds*, Journal of Mathematics and Computers in Simulation, 79 (2008) pp. 1298–1323.
- [16] E. Celledoni, D. Cohen and B. Owren, *Symmetric exponential integrators for the cubic Schroedinger equation*, Journal of FoCM, 8 (2008), n. 3, 303–317.

- [17] E. Celledoni, F. Fassò, N. Säfström and A. Zanna, *The exact computation of the free rigid body motion and its use in splitting methods*, SIAM Journal on Sci. Stat. Comp. vol. 30 issue 4, pp. 2084-2112, 2008.
- [18] E. Celledoni and T. Kvamsdal, *Parallelism in time for the solution of a time dependent Stokes problem*, International Journal of Numerical Methods in Engineering, vol. 79, pp. 576-598, 2009.
- [19] E. Celledoni, R. McLachlan, D. McLaren, B. Owren, R. Quispel and W. Wright, *Energy-preserving Runge-Kutta methods*. M2AN (Mathematical Modelling and Numerical Analysis), vol. 43 (4), pp. 645-649.
- [20] E. Celledoni and B.K. Kometa, *Semi-Lagrangian exponential integrators for convection dominated problems*. Journal of Scientific Computing, vol. 41, Issue 1 (2009), pp. 139–164.
- [21] E. Celledoni and A. Zanna, *FRB-FORTRAN routines for the exact computation of free rigid body motions*, ACM ToMS, vol 37 nr. 2 (2010).
- [22] E. Celledoni, R. McLachlan, B. Owren, R. Quispel, *On conjugate B-series and their geometric structure*. JNAIAM vol 5, pp 85-94, (2010).
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- [24] E. Celledoni and N. Säfström, *Hamiltonian and multi-symplectic structure of a rod model using quaternions*. CMAME, vol. 199(45-48), pp.2813-2819 (2010).
- [25] E. Celledoni and B.K. Kometa, *Semi-Lagrangian multistep methods for index 2 differential algebraic systems*, J. of Comp. Phys. 230, pp 3413-3429 (2011).

Preprints

- [26] E. Celledoni, B. K. Kometa and O. Verdier *Semi-Lagrangian exponential integrators for the incompressible Navier-Stokes equations*. NTNU report, Numerics No.7/11. Submitted.
- [27] E. Celledoni, F. Grimm, R.I. McLachlan, D.I. McLaren, B. Owren, G.R.W. Quispel, *Preserving energy resp. dissipation in numerical PDEs, using the average vector field method*, preprint University of Melbourne/ NTNU reports, Numerics No. 8/09. Submitted.

Articles in Proceedings

- [28] E. Celledoni and N. Säfström, *An elastic rod model and its Hamiltonian structure*. Proceedings of the ICNAAM conference, Crete, september 2009.
- [29] E. Celledoni, R. McLachlan, D. McLaren, B. Owren, R. Quispel and W. Wright *Energy-preserving methods and B-series*. Proceedings of the 21st Nordic seminar in Computational Mechanics.

- [30] E. Celledoni and N. Säfström, *A symmetric splitting method for rigid body dynamics*, Proceedings of the SIMS 2005 Conference, Trondheim, October 13th-14th, 2005. Tapir Academic Press.
- [31] E. Celledoni and T. Kvamsdal, *Parallelism in time for the solution of the time dependent Stokes problem*, In Proceedings of the International Conference on Parallel CFD, Gran Canary, Carary Island, Spain 24th-27th May 2004.
- [32] E. Celledoni, G. Johannessen and T. Kvamsdal, *Parallelization of a CFD code: the use of Aztec library in the parallel numerical simulation of Extrusion of Aluminium*, in Proceedings of the Parallel CFD Conference (May 22-25, 2000), Jenssen et al. editors, North - Holland, pp. 291–298.

Edited proceedings

- [33] J. Amundsen, H. I. Andersson, E. Celledoni, T. Gravdahl, F. A. Michelsen, H. R. Nagel, T. Natvig (eds.), Proceedings of the 46th Conference on Simulation and Modeling (SIMS 2005), 13-14 October 2005, Trondheim, Norway. Trondheim, Tapir Academic Press. ISBN 82-519-2093-0. 364 s.

Reports for the Research Council of Norway

- [34] G. Gisler, E. Celledoni, T.U. Helgaker, T. Iversen, K.S. Jakobsen, C. Jones, A. Lipniacka, A. Lundervold, N.R.B. Olsen, K. De Smedt, J. Koster, G. Hst, 2010, The scientific case for eInfrastructure in Norway, published by the Norwegian Research Council, ISBN 978-82-12-02831-9.
- [35] G. Gisler, D. Borge, E. Celledoni, T.U. Helgaker, C. Jones, A. Lipniacka, A. Lundervold, S. Oepen, N.R.B. Olsen, J. Koster, G. Hst, 2010, eInfrastructure use roadmap, published by the Norwegian Research Council, to appear.