

Marco Caliarì's Curriculum Vitae

Personal information

Marco Caliarì
Via Pace, 12
37064 Povegliano Veronese (VR)

e-mail `marco.caliari@univr.it`

Born on October 6, 1976, Villafranca di Verona, Verona,
ITALY

Research interests

Exponential integrators for linear and nonlinear semidiscretized PDEs (finite differences, finite elements, spectral methods, “meshfree”), with particular emphasis on matrix exponential approximation (cf. [5, 32, 6, 3, 33, 4, 21, 11, 39, 38, 25, 23, 24, 17, 18]).

Numerical integrators for nonlinear Schrödinger equations (finite elements, spectral methods, exponential splitting methods) (cf. [16, 19, 39, 31, 40, 1, 22]) and computation of ground states (cf. [26, 28, 29, 30, 27]).

Bivariate and trivariate polynomial interpolation and hyperinterpolation at optimal nodal sets such as Padua points (cf. [12, 13, 9, 8, 13, 10, 35, 14, 15, 34, 20, 7]).

Current position

since 10/2015 Associate Professor in Numerical Analysis at University of Verona.

Previous positions

10/2007–09/2015 Assistant Professor in Numerical Analysis at University of Verona.

05/2006–08/2007 Visiting position at Institut für Mathematik, Innsbruck, Austria, supervisor Prof. Alexander Ostermann, partially supported by “Fondazione Ing. Aldo Gini” fellowship.

09/2005–08/2007 Post-doc position at University of Padua.

03/2004–08/2005 Research fellowship *Approssimazione numerica con elementi finiti di PDEs e polinomiale di operatori integrali* at the Department of Computer Science of the University of Verona.

03/2003–02/2004 Fellowship *Studio numerico di un modello stocastico per fluidi quantistici* at the Department of Computer Science of the University of Verona.

Education

11/1999–11/2002 Ph.D. in Computational Mathematics, XV ciclo, University of Padua. Dissertation title *Efficient implementation of exponential integrators for 2D and 3D advection-diffusion equations*. Supervisors: Prof. Marco Vianello and Dr. Luca Bergamaschi.

09/1995–11/1999 Degree in Mathematics, University of Padua. Dissertation title “Calcolo dell’operatore esponenziale per matrici sparse, non simmetriche, di grande dimensione”. Supervisors: Prof. Marco Vianello and Dr. Luca Bergamaschi.

Talks, seminars, conferences

09/2016 Member of the Organizing and Scientific Committees of *Dolomites Workshop on Constructive Approximation and Applications 2016*, September 8–13, 2016, Alba di Canazei (TN).

03/2016 *Splitting methods for the magnetic Schrödinger equation*, MOX, Politecnico di Milano, March 31, 2016.

09/2015 *Splitting methods for the Schrödinger equation with vector potential*, invited speaker at the minisymposium *Non-linear evolution equations*, NUMDIFF-14, September 7–11, 2015, Halle (Germany).

09/2014 Member of the Organizing Committee of *Dolomites Research Week on Approximation 2014*, September 8–12, Alba di Canazei (TN).

11/2013 Member of the Organizing Committee of *Workshop on Multivariate Approximation*, November 29–30, 2013, Verona.

09/2013 Member of the Organizing Committee of *Dolomites Research Week on Approximation 2013*, September 9–13, Alba di Canazei (TN).

09/2012 Member of the Organizing Committee of *3rd Dolomites Workshop on Constructive Approximation and Applications*, September 9–14, Alba di Canazei (TN).

09/2011 Member of the Organizing Committee of *Dolomites Research Week on Approximation 2011*, September 5–9,

- Alba di Canazei (TN).
- 07/2011 *Approximation of operator functions for exponential integrators*, ICIAM 2011, July 18–22, Vancouver (CANADA).
- 10/2010 Innovative integrators, October 27–30, Innsbruck (A).
- 09/2010 Member of the Organizing Committee of *Dolomites Research Week on Approximation 2010*, September 6–9, Alba di Canazei (TN).
- 09/2010 *Meshfree exponential integrators*, Dolomites Research Week on Approximation 2010, September 6–9, Alba di Canazei (TN).
- 04/2010 *A splitting method for the magnetic Schrödinger equation*, invited speaker at Two days on Splitting Methods for Evolution Equations, April 7–10, 2010, Igls–Vill (Innsbruck, A).
- 09/2009 *Spectral methods for dissipative nonlinear Schrödinger equations*, Three days on Mathematical Models of Quantum Fluids, September 14–17, 2009, Verona.
- 09/2009 Member of the Organizing Committee of workshop *Three days on Mathematical Models of Quantum Fluids*, September 14–17, Verona.
- 09/2009 Member of the Organizing Committee of *2nd Dolomites Workshop on Constructive Approximation and Applications*, September 4–9, Alba di Canazei (TN).
- 09/2009 *Polynomial interpolation and algebraic cubature at the Padua points*, 2nd Dolomites Workshop on Constructive Approximation and Applications, September 4–9, 2009, Alba di Canazei (TN).
- 07/2009 *A numerical code for fast interpolation and cubature at the Padua points*, 9th International Conference Computational and Mathematical Methods in Science and Engineering, June 30, July 1–3, 2009, Gijón (E).
- 05/2009 *Padua points: theory, computation and applications*, 5th Austrian Numerical Analysis Day, May 7–8, Innsbruck (A).
- 09/2008 *Efficient implementation of bivariate interpolation and cubature at Padua points*, SIMAI 2008, September 15–19, Roma.

- 09/2008 Member of the Organizing Committee of *Dolomites Research Week on Approximation 2008*, September 4–8, Alba di Canazei (TN).
- 07/2008 *Dynamics of rotating Bose–Einstein condensates*, Mathematikkolloquium, July 30, Universität Innsbruck (A).
- 04/2008 *A minimisation approach for computing the ground state of Gross–Pitaevskii systems*, Nonlinear Phenomena in Degenerate Quantum Gases 2008, April 1–4, Toledo (E).
- 01/2008 *Location and phase segregation of ground states for 2D Gross–Pitaevskii systems*, Mathematikkolloquium, January 8, Universität Innsbruck (A) .
- 09/2007 Member of the Organizing Committee of *Dolomites Research Week on Approximation 2007*, September 3–7, Alba di Canazei (TN).
- 07/2007 *Efficient Implementation of exponential Rosenbrock-type methods*, SciCADE 2007, July 9–13, 2007, Saint-Malo (F).
- 04/2007 *Implementation of Rosenbrock-type exponential methods*, 3rd Austrian Numerical Analysis Day, April 26–27, Wien (A).
- 09/2006 Member of the Organizing Committee of *1st Dolomites Workshop on Constructive Approximation and Applications*, September 8–12, Alba di Canazei (TN).
- 09/2006 *Bivariate Lagrange interpolation at the Padua points: computational aspects*, 1st Dolomites Workshop on Constructive Approximation and Applications, September 8–12, Alba di Canazei (TN).
- 09/2006 *(Iper)interpolazione su domini bivariati*, Department seminar, September 5, Department of Computer Science, University of Verona.
- 07/2006 *Comparing Leja and Krylov approximations of large scale matrix exponentials*, Applied Linear Algebra 2006, July 24–27, Düsseldorf (D).
- 06/2006 *Efficient approximation of the exponential operator by the ReLPM*, High Performance Computing Seminar, June 29, Institut für Astro- u. Teilchenphysik, ZID, Institut für Informatik, Universität Innsbruck (A).
- 05/2006 *Comparing Leja and Krylov approximations of large scale*

- matrix exponentials*, ICCS 2006, May 28–31, Reading (UK).
- 05/2005 *The Leja–Euler–Midpoint exponential integrator for parabolic equations*, International conference “Numerical Analysis: the State of the Art”, May 19–21, Rende (CS).
- 06/2004 *The ReLPM exponential integrator for FE discretizations of advection-diffusion equations*, ICCS 2004, June 6–9, Krakow (POLAND).
- 05/2004 *A ReLPM-based exponential intergrator for advection-diffusion-reaction equations*, workshop on Dynamical Systems on Matrix Manifolds: Numerical Methods and Applications, May 27–28, 2004, Bari.
- 03/2004 *Numerical experiments of generation of vortex lines in Madelung fluid*, miniworkshop on Mathematical Problems in Modeling Generation and Dynamics of Vortices, March 12–13, 2004, Verona.
- 09/2003 *Un integratore esponenziale basato sull’interpolazione di Leja per problemi di convezione-diffusione 2D e 3D*, XVII UMI Conference, September 8–13, 2003, Milano.
- 07/2003 *Dinamica di un superfluido da un modello stocastico*, Department seminar, Department of Computer Science, University of Verona.
- 06–07/2003 *The real Leja points method of propagation for advection-diffusion equations*, SciCADE 2003, June 30–July 4, 2003, Trondheim (NORWAY).
- 03/2003 *Approssimazione efficiente dell’esponenziale di matrice per problemi di convezione-diffusione*, “Due giorni di algebra lineare numerica”, March 6–7, 2003, Pisa.
- 05/2002 *Interpolating discrete advection-diffusion propagators at spectral Leja sequences*, SIMAI 2002, May 27–31, Chia Laguna (CA).
- 07–08/2001 *Efficient approximation of the exponential operator for 2D advection-diffusion problems*, SciCADE 2001, July 29–August 3, 2001, Vancouver (CANADA).

Research projects

- 2017 GNCS Project “Multivariate approximation: theory and applications” (coord. Prof. Stefano De Marchi).

- 2012 GNCS Project “Approssimazione multivariata con basi polinomiali e radiali” (coord. Prof. Marco Vianello).
- 2011 TWF-Projekt Nr. UNI-0404/880 (Tiroler Wissenschaftsfonds) “Meshfree exponential integrators” (coord. Dr. Stefan Rainer).
- 2010 GNCS Project “Near Optimal Points for Multivariate Interpolation” (coord. Prof. Leonard Peter Bos).
- 2009–2010 University of Padua Project “Progetto Interpolazione ed Estrapolazione: nuovi algoritmi ed applicazioni” (coord. Prof. Michela Redivo Zaglia).
- 2009 GNCS Young Researchers “Metodi numerici per equazioni di Schrödinger non lineari”.
- 2007–2008 University of Verona, Department of Computer Science Project “Soluzione groundstate per l’equazione di Gross–Pitaevskii”.
- 2004–2005 PRIN 2004 “Campi aleatori, evoluzioni stocastiche ed applicazioni a modelli di sistemi interagenti” (coord. Prof. Albert Gandolfi), Verona unity “Modelli stocastici in dimensione finita e infinita e limiti di scala” (coord. Prof. Laura Maria Morato).
- 2003–2004 PRIN 2003 “Sistemi dinamici su manifolds di matrici: metodi numerici ed applicazioni” (coord.. Prof. Luciano Lopez), Padova unity “Approssimazione di funzioni di matrici per la soluzione numerica di equazioni differenziali” (coord. Prof. Marco Vianello).
- 2003 PRIN 2003 “Processi stocastici a struttura spaziale e loro applicazioni” (coord. Prof. Alberto Gandolfi), Verona unity “Problemi limite per processi con struttura spaziale e algoritmi stocastici” (coord. Prof. Laura Maria Morato).
- 2002 University of Padua Project “Metodi efficienti per l’approssimazione di trasformate discrete non locali” (coord. Prof. Marco Vianello).

Teaching and supervision

- 04/2017 Mentor of Google Summer of Code 2017 for Michele Ginesi, project *Special functions in GNU Octave*.
- 03/2017 Supervisor of Chiara Segala Master’s Thesis *Implementation of exponential integrators in GNU Octave*, University of Verona.

- 2016–2017 Lecturer of Laboratorio di Sistemi Stocastici, Metodi Numerici per le Equazioni Differenziali in Bachelor’s Degree in Applied Mathematics and Advanced Numerical Analysis II and Research and Scientific Computin in Master’s Degree in Mathematics at University of Verona.
- 07/2016 Supervisor of Franco Zivcovich Master’s Thesis *Hermite interpolation for the matrix exponential*, University of Verona.
- 2015–2016 Lecturer of Laboratorio di Sistemi Stocastici, Metodi Numerici per le Equazioni Differenziali in Bachelor’s Degree in Applied Mathematics and Advanced Numerical Analysis II and Research and Modelling Seminar in Master’s Degree in Mathematics at University of Verona.
- 05/2016 Mentor of ESA Summer of Code 2016 for Cristiano Dorigo, project *Iterative methods for sparse linear systems in GNU Octave*.
- 04/2016 Mentor of Google Summer of Code 2016 for Chiara Segala, project *Exponential integrators in GNU Octave*.
- 11/2015 Supervisor of Giada Basso Bachelor’s Thesis *Simulazione Numerica della Dinamica di Vortici Quantistici*, University of Verona.
- 2014–2015 Lecturer of Laboratorio di Sistemi Stocastici, Metodi Numerici per le Equazioni Differenziali in Bachelor’s Degree in Applied Mathematics and Advanced Numerical Analysis II and Scientific Computing in Master’s Degree in Mathematics at University of Verona.
- 03/2015 Supervisor of Gregorio Pellegrini Master’s Thesis *Polynomial Chaos Expansion with applications to PDEs*, University of Verona.
- 03/2015 Supervisor of Cristiano Dorigo Bachelor’s Thesis *Is Householder orthogonalization better than Gram-Schmidt in GMRES?*, University of Verona.
- 03/2015 Supervisor of Franco Zivcovich Bachelor’s Thesis *Interpolazione di Hermite–Newton–Leja per l’esponenziale di matrice*, University of Verona.
- 2014–2015 Lecturer in Piano Lauree Scientifiche entitled “Ottimizzazione” with Liceo Scientifico Statale “E. Medi”, Villafranca di Verona.
- 10/2014 Second advisor of Stefan Rainer Ph.D. Thesis *Meshfree*

- exponential integrators*, supervisor Prof. Alexander Ostermann, University of Innsbruck.
- 10/2014 Supervisor of Elena Gaburro Master's Thesis *Domain decomposition methods and high order edge finite elements in applied computational electromagnetism*, University of Verona.
- 2013–2014 Lecturer of Laboratorio di Sistemi Stocastici, Metodi Numerici per le Equazioni Differenziali in Bachelor's Degree in Applied Mathematics and Laboratory of Advanced Numerical Analysis in Master's Degree in Mathematics at University of Verona.
- 2013–2014 Lecturer in Piano Lauree Scientifiche entitled "Crittografia" with ITIS "G. Marconi", Liceo Scientifico "A. Messedaglia" and il Liceo Scientifico "G. Fracastoro" of Verona.
- 2013–2014 Lecturer in Piano Lauree Scientifiche entitled "Crittografia" with Liceo Scientifico Statale "E. Medi" of Villafranca di Verona.
- 07/2013 Supervisor of Giulia Simeoni Master's Thesis *Numerical investigation of soliton dynamics for nonlinear Schrödinger equations*, University of Verona.
- 07/2013 Supervisor of Roberta Barbi Bachelor's Thesis *Computing the first eigenpar of the p -Laplacian*, University of Verona.
- 03/2013 Supervisor of Sara Novarini Bachelor's Thesis *Un metodo numerico per la valutazione dei bond a scadenza sul modello di Schaefer e Schwartz*, University of Verona.
- 03/2013 Supervisor of Mattia Tenuti Bachelor's Thesis *Inclusione di codice compilato in un ambiente per il calcolo numerico*, University of Verona.
- 03/2013 Co-supervisor of Marcello Bellomi Master's Thesis *Eigenvalue problems in anisotropic spaces*, supervisor Prof. Marco Squassina, University of Verona.
- 2012–2013 Lecturer in Piano Lauree Scientifiche entitled "Crittografia" with Liceo Scientifico Statale "E. Medi" of Villafranca di Verona.
- 12/2012 Supervisor of Diego Rigo Bachelor's Thesis *Analisi di un metodo del terzo ordine per le equazioni iperboliche*, University of Verona.

- 12/2012 Supervisor of Chiara Piazzola Bachelor's Thesis *Analisi di un metodo del terzo ordine per il trasporto di funzioni discontinue*, University of Verona.
- 2012–2013 Lecturer of Laboratorio di Sistemi Stocastici, Metodi Numerici per le Equazioni Differenziali in Bachelor's Degree in Applied Mathematics and Scientific Computing and Laboratory of Advanced Numerical Analysis in Master's Degree in Mathematics at University of Verona.
- 10/2012 Supervisor of Mauro Bonafini Bachelor's Thesis *Efficient numerical methods for soliton dynamics of nonlinear Schrödinger equations*, University of Verona.
- 12/2011 Supervisor of Alessandro Stella Bachelor's Thesis *Confronto tra integratori esponenziali per il prezzamento di opzioni americane*, University of Verona.
- 2010–2011 Lecturer of Laboratorio di Sistemi Stocastici, Metodi Numerici per le Equazioni Differenziali in Bachelor's Degree in Applied Mathematics and Scientific Computing in Master's Degree in Mathematics at University of Verona.
- 2011–2012 Lecturer in Piano Lauree Scientifiche entitled "Probabilità, statistica e false credenze" with Liceo Scientifico Statale "E. Medi" di Villafranca di Verona.
- 10/2011 Supervisor of Andrea Alban Bachelor's Thesis *Metodi numerici per il prezzamento di opzioni asiatiche*, University of Verona.
- 2010–2011 Lecturer of Laboratorio di Sistemi Stocastici, Metodi Numerici per le Equazioni Differenziali in Bachelor's Degree in Applied Mathematics and Scientific Computing in Master's Degree in Mathematics, University of Verona.
- 2010–2011 Lecturer in Piano Lauree Scientifiche entitled "Probabilità, statistica e false credenze" with Liceo Scientifico Statale "E. Medi" di Villafranca di Verona.
- 20/2010 Supervisor of Lisa Formis Bachelor's Thesis *Exponential integrators for option pricing*, University of Verona.
- 10/2010 Supervisor of Simone Parisotto Bachelor's Thesis *Nonequispaced Fourier Transform and Applications*, University of Verona.
- 03/2010 Supervisor of Matteo Merci Bachelor's Thesis *Metodi di calcolo per probabilità invarianti per catene di Markov*, University of Verona.

- 2009–2010 Lecturer of Laboratorio di Calcolo Numerico, Laboratorio di Sistemi Stocastici, Metodi Numerici per le Equazioni Differenziali in Bachelor’s Degree in Applied Mathematics, University of Verona.
- 2009–2010 Lecturer in Progetto Lauree Scientifiche entitled “Dinamica di popolazioni” with Liceo Scientifico Statale “E. Medi” di Villafranca di Verona.
- 11/2009 Co-supervisor of Chiara Carraro Bachelor’s Thesis *Simulazione di un modello stocastico di ecosistema cellulare*, supervisor Prof. Laura Maria Morato, University of Verona.
- 11/2009 Supervisor of Anna Bassi Bachelor’s Thesis *The shooting method for a stock value*, University of Verona.
- 09/2009 Supervisor of Sara Mazzi Bachelor’s Thesis *A numerical approach for computing the ground state of a nonlinear Schrödinger equation*, University of Verona.
- 03/2009 Co-supervisor of Mark Pianegonda Bachelor’s Thesis *Orbite periodiche della mappa del gatto*, supervisor Prof. Gaetano Zampieri, University of Verona.
- 2008–2009 Lecturer of Laboratorio di Calcolo Numerico, Laboratorio di Sistemi Stocastici, Laboratorio di Metodi Numerici per le Equazioni Differenziali in Bachelor’s Degree in Applied Mathematics, University of Verona.
- 2008–2009 Lecturer of “Introduzione ad un ambiente per il calcolo scientifico”, in the Ph.D. program in Neuroscienze e Scienze Psicologiche e Psichiatriche, University of Verona.
- 2008–2009 Lecturer in Progetto Lauree Scientifiche entitled “Dinamica di popolazioni” with Liceo Scientifico Statale “E. Medi” di Villafranca di Verona.
- 2007–2008 Lecturer of Matematica di Base, Laboratorio di Calcolo Numerico, Laboratorio di Metodi Numerici per le Equazioni Differenziali in Bachelor’s Degree in Applied Mathematics, University of Verona.
- 07/2007 Co-supervisor of Roberto Montagna Bachelor’s Thesis *Iperinterpolazione su punti di Xu e interpolazione su punti di Padova: aspetti computazionali*, supervisor Prof. Stefano De Marchi, University of Verona.

Publications

- [1] A. J. Allen, S. Zuccher, M. Caliarì, N. P. Proukakis, N. G. Parker, and C. F. Barenghi, *Vortex reconnections in atomic condensates at finite temperature*, *Phys. Rev. A* **90** (2014), 013601.
- [2] M. Bellomi, M. Caliarì, and M. Squassina, *Computing the first eigenpair for problems with variable exponents*, *J. Fix. Point Theory Appl.* **13** (2013), no. 2, 561–570.
- [3] L. Bergamaschi, M. Caliarì, A. Martínez, and M. Vianello, *A parallel exponential integrator for large-scale discretizations of advection-diffusion models*, Recent Advances in Parallel Virtual Machine and Message Passing Interface (Berlin/Heidelberg) (B. Di Martino, D. Kranzlmüller, and J. Dongarra, eds.), *Lecture Notes in Comput. Sci.*, vol. 3666, Springer, 2005, 12th European PVM/MPI Users' Group Meeting Sorrento, Italy, September 18–21, 2005. Proceedings, pp. 483–492.
- [4] ———, *Comparing Leja and Krylov approximations of large scale matrix exponentials*, *Computational Science — ICCS 2006* (Berlin/Heidelberg) (V. N. Alexandrov, G. D. van Albada, P. M. A. Sloot, and J. Dongarra, eds.), *Lecture Notes in Comput. Sci.*, vol. 3994, Springer, 2006, 6th International Conference, Reading, UK, May 28–31, 2006, Proceedings, Part IV, pp. 685–692.
- [5] L. Bergamaschi, M. Caliarì, and M. Vianello, *Efficient approximation of the exponential operator for discrete 2D advection-diffusion problems*, *Numer. Linear Algebra Appl.* **10** (2003), no. 3, 271–289.
- [6] ———, *The ReLPM exponential integrator for FE discretizations of advection-diffusion equations*, *Computational Science — ICCS 2004* (Berlin/Heidelberg) (M. Bubak, G. D. v. Albada, P. M. A. Sloot, and J. Dongarra, eds.), *Lecture Notes in Comput. Sci.*, vol. 3039, Springer, 2004, 4th International Conference, Kraków, Poland, June 6–9, 2004, Proceedings, Part IV, pp. 434–442.
- [7] L. P. Bos and M. Caliarì, *Application of modified Leja sequences to polynomial interpolation*, *Dolomites Res. Notes Approx.* **8** (2015), 66–74.
- [8] L. P. Bos, M. Caliarì, S. De Marchi, and M. Vianello, *Bivariate interpolation at Xu points: results, extensions and applications*, *Electron. Trans. Numer. Anal.* **25** (2006), 1–16.
- [9] ———, *A numerical study of the Xu interpolation formula in two variables*, *Computing* **76** (2006), no. 3–4, 311–324.
- [10] L. P. Bos, M. Caliarì, S. De Marchi, M. Vianello, and Y. Xu, *Bivariate Lagrange interpolation at the Padua points: the generating curve approach*, *J. Approx. Theory* **143** (2006), no. 1, 15–25.

- [11] M. Caliari, *Accurate evaluation of divided differences for polynomial interpolation of exponential propagators*, Computing **80** (2007), no. 2, 189–201.
- [12] M. Caliari, S. De Marchi, and M. Vianello, *Bivariate polynomial interpolation on the square at new nodal sets*, Appl. Math. Comput. **165** (2005), no. 2, 261–274.
- [13] ———, *Hyperinterpolation on the square*, J. Comput. Appl. Math. **210** (2007), no. 1–2, 78–83, Proc. of Numerical Analysis: the State of the Art (NAC2005), Rende (CS), Italy, May 19–21, 2005.
- [14] ———, *Bivariate Lagrange interpolation at the Padua points: Computational aspects*, J. Comput. Appl. Math. **221** (2008), no. 2, 284–292.
- [15] ———, *Hyperinterpolation in the cube*, Comp. Math. Appl. **55** (2008), no. 11, 2490–2497.
- [16] M. Caliari, G. Inverso, and L. M. Morato, *Dissipation caused by a vorticity field and generation of singularities in Madelung fluid*, New J. Phys. **6** (2004), no. 69.
- [17] M. Caliari, P. Kandolf, A. Ostermann, and S. Rainer, *Comparison of software for computing the action of the matrix exponential*, BIT **54** (2014), no. 1, 113–128.
- [18] ———, *The Leja method revisited: backward error analysis for the matrix exponential*, SIAM J. Sci. Comput. **38** (2016), no. 3, A1639–A1661.
- [19] M. Caliari, M. I. Loffredo, L. M. Morato, and S. Zuccher, *Cubic nonlinear Schrödinger equation with vorticity*, New J. Phys. **10** (2008), no. 123020.
- [20] M. Caliari, S. De Marchi, A. Sommariva, and M. Vianello, *Padua2DM: fast interpolation and cubature at the Padua points in Matlab/Octave*, Numer. Algor. **56** (2011), no. 1, 45–60.
- [21] M. Caliari and A. Ostermann, *Implementation of exponential Rosenbrock-type methods*, Appl. Numer. Math. **59** (2009), no. 3–4, 568–581.
- [22] M. Caliari, A. Ostermann, and C. Piazzola, *A splitting approach for the magnetic Schrödinger equation*, J. Comput. Appl. Math. **316** (2017), 74–85.
- [23] M. Caliari, A. Ostermann, and S. Rainer, *Meshfree integrators*, Oberwolfach Reports **8** (2011), no. 1, 883–885.
- [24] ———, *Meshfree exponential integrators*, SIAM J. Sci. Comput. **35** (2013), no. 1, A431–A452.

- [25] ———, *A Meshfree splitting method for soliton dynamics in nonlinear Schrödinger equations*, Meshfree Methods for Partial Differential Equations VI (M. Griebel and M. A. Schweitzer, eds.), Lect. Notes Comput. Sci. Eng., vol. 89, Springer, 2013, Sixth International Workshop on Meshfree Methods, Bonn, Germany, October 2011, pp. 127–139.
- [26] M. Caliari, A. Ostermann, S. Rainer, and M. Thalhammer, *A minimisation approach for computing the ground state of Gross–Pitaevskii systems*, J. Comput. Phys. **228** (2009), no. 2, 349–360.
- [27] M. Caliari and S. Rainer, *GSGPEs: a MATLAB code for computing the ground state of systems of Gross–Pitaevskii equations*, Comput. Phys. Commun. **184** (2013), no. 3, 812–823.
- [28] M. Caliari and M. Squassina, *Location and phase segregation of ground and excited states for 2D Gross–Pitaevskii systems*, Dyn. Partial Differ. Equ. **5** (2008), no. 2, 117–137.
- [29] ———, *Spatial patterns for the three species Gross–Pitaevskii system in the plane*, Electron. J. Diff. Eqns. **2008** (2008), no. 79, 1–15.
- [30] ———, *Numerical computation of soliton dynamics for NLS equations in a driving potential*, Electron. J. Diff. Eqns. **89** (2010), 1–12.
- [31] ———, *On a bifurcation value related to quasi-linear Schrödinger equations*, J. Fix. Point Theory Appl. **12** (2012), no. 1–2, 121–133.
- [32] M. Caliari, M. Vianello, and L. Bergamaschi, *Interpolating discrete advection-diffusion propagators at Leja sequences*, J. Comput. Appl. Math. **172** (2004), no. 1, 79–99.
- [33] ———, *The LEM exponential integrator for advection-diffusion reaction equations*, J. Comput. Appl. Math. **210** (2007), no. 1–2, 56–63, Proc. of Numerical Analysis: the State of the Art (NAC2005), Rende (CS), Italy, May 19–21, 2005.
- [34] M. Caliari, M. Vianello, and S. De Marchi, *Algorithm 886: Padua2D—Lagrange Interpolation at Padua Points on Bivariate Domains*, ACM Trans. Math. Software **35** (2008), no. 3, 21:1–21:11.
- [35] M. Caliari, M. Vianello, S. De Marchi, and R. Montagna, *HYPER2D: a numerical code for hyperinterpolation at Xu points on rectangles*, Appl. Math. Comp. **183** (2006), no. 2, 1138–1147.
- [36] M. Caliari and S. Zuccher, *The inverse power method for the $p(x)$ -Laplacian problem*, J. Sci. Comput. **65** (2015), no. 2, 698–714.
- [37] ———, *Quasi-Newton minimization for the $p(x)$ -Laplacian problem*, J. Comput. Appl. Math. **309** (2017), 122–131.

- [38] A. Martínez, L. Bergamaschi, M. Caliori, and M. Vianello, *A massively parallel exponential integrator for advection-diffusion models*, J. Comput. Appl. Math. **231** (2009), no. 1, 82–91.
- [39] M. Thalhammer, M. Caliori, and C. Neuhauser, *High-order time-splitting Hermite and Fourier spectral methods*, J. Comput. Phys. **228** (2009), no. 3, 822–832.
- [40] S. Zuccher, M. Caliori, A. W. Baggaley, and C. F. Barenghi, *Quantum vortex reconnections*, Phys. Fluids **24** (2012), no. 125108, 1–21.

Verona, June 29, 2017

Marco Caliori