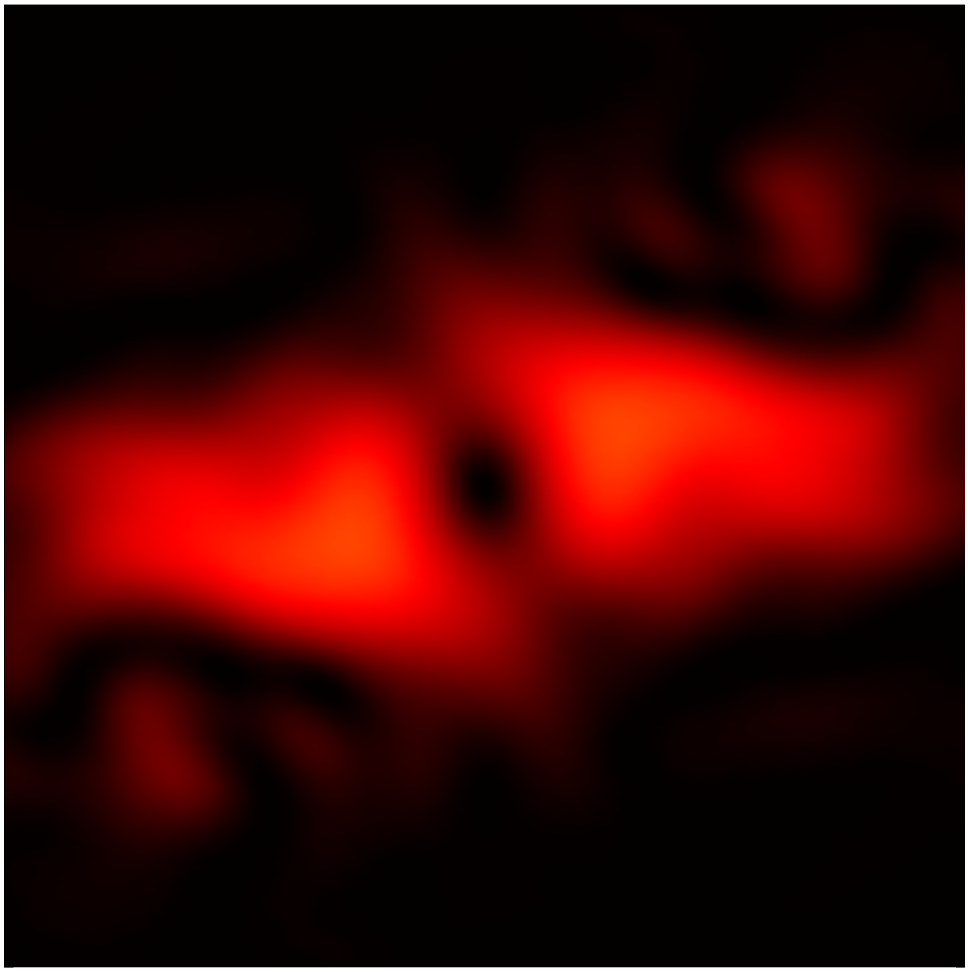
Curriculum Vitae

Mechthild Thalhammer



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Address

Mechthild Thalhammer
Leopold–Franzens-Universität Innsbruck
Fakultät für Mathematik, Informatik und Physik (MIP)
Institut für Mathematik
Technikerstraße 13/VII
6020 Innsbruck
Austria

Email-Address. Mechthild.Thalhammer@uibk.ac.at
Website. techmath.uibk.ac.at/mecht

1 Personal data and education

Personal data

Name, First name	Thalhammer, Mechthild Maria Franziska
Title	Univ.-Prof. Dr. Mag. rer. nat.
Gender	Female
Dates of birth	April 22, 1974, Innsbruck, Austria
Parents	Lill-Astrid and Johann Thalhammer
Citizenship	Austrian

Education

1980 – 1984	Primary school, Völs
1984 – 1992	Secondary school *Bundesgymnasium und Bundesrealgymnasium Sillgasse*, Innsbruck
June 15, 1992	School leaving examination (mit Auszeichnung)
1989 – 1994	Conservatory *Tiroler Landeskonservatorium* (Subject flute)
1992 – 2001	Study of Mathematics, Universität Innsbruck
March 22, 1997	Mag. rer. nat. (Universität Innsbruck, mit Auszeichnung)
January 17, 2001	Dr. rer. nat. (Universität Innsbruck, mit Auszeichnung)
June 12, 2006	Habilitation colloquium

2 Academic positions and achievements

Academic positions (Universität Innsbruck)

October 1998 – June 1999	*Studienassistentin*, Institut für Technische Mathematik, Geometrie und Bauinformatik
October 1999 – April 2000	*Vertragsassistentin* (50%, substitute), Institut für Technische Mathematik, Geometrie und Bauinformatik
October 2000 – October 2004	*Vertragsassistentin* (50%), Institut für Technische Mathematik, Geometrie und Bauinformatik
October 2004 – September 2006	*Vertragsassistentin*, Institut für Mathematik
October 2006 – February 2014	*Vertragsdozentin*, Institut für Mathematik
Since March 2014	*Professorin §99 (3)*, Institut für Mathematik (positive evaluation 2020, permanent status)

Visiting position, Professorship (substitute)

October 2001 – September 2002	*Charge d'enseignement suppléant*, Section de Mathématiques, Université de Genève, Switzerland
October 2011 – June 2012	Vertretungsprofessur *Numerische Methoden in der Luft- und Raumfahrttechnik* (W3), Fakultät für Luft- und Raumfahrttechnik, Universität der Bundeswehr München, Germany

Berufungsverfahren

Universitätsprofessur für Angewandte Analysis, Institut für Mathematik, Alpen-Adria-Universität Klagenfurt, 2010/11, 2. Listenplatz

W2-Professur für Mathematik insbesondere Numerik, Fakultät für Mathematik, Universität Bielefeld, 2012/13, 3. Listenplatz

3 Teaching activities and lecture notes

See also techmath.uibk.ac.at/mecht/MyHomepage/TeachingOverview.html

Teaching activities (Universität Innsbruck)

Academic year 1998/1999	*Mathematik A & B* (Exercises)
Academic year 1999/2000	*Wissenschaftliches Rechnen* (Exercises), *Mathematik B* (Exercises)
Academic year 2000/2001	*Wissenschaftliches Rechnen* (Exercises), *EDV für Bauingenieure* (Exercises), *Mathematik B* (Exercises)
Academic year 2002/2003	*Mathematik 1 & 2* (Exercises), *Informatik* (Exercises), *Numerische Mathematik* (Exercises)
Academic year 2003/2004	*Mathematik 1 – Differential- und Integralrechnung* (Lecture), *Mathematik 1 & 2* (Exercises), *Numerische Mathematik* (Exercises)
Winter term 2004/2005	*Mathematik für Physiker 2 – Analysis* (Lecture), *Höhere Analysis* (Exercises)
Academic year 2005/2006	*Analysis 1 & 2* (Exercises), *Numerische Analysis* (Lecture, Exercises), *Numerische Mathematik 2* (Exercises)
Academic year 2006/2007	*Analysis 1* (Exercises), *Analysis 2* (Lecture), *Numerische Analysis* (Lecture, Exercises), *Numerische Lineare Algebra* (Exercises), *Algorithmische Mathematik 2* (Lecture), *Mathematikprojekt an Pflichtschulen* (Practical exercises)
Academic year 2007/2008	*Numerische Mathematik 1 & 2 (Diplom)* (Lecture, Exercises), *Numerische Mathematik 1 & 2 (Bachelor)* (Practical exercises), *Mathematisches Schulprojekt Mathe-Cool!* (Practical exercises)
Academic year 2008/2009	*Numerische Mathematik 1 & 2 (Bachelor)* (Lecture), *Numerik partieller Differentialgleichungen* (Lecture, Exercises), *Mathematisches Schulprojekt Mathe-Cool!* (Practical exercises)
Academic year 2009/2010	*Einführung in die Mathematik 1* (Exercises), *Seminar Problemlösen*, *Numerik partieller Differentialgleichungen* (Lecture, Exercises), *Mathematisches Schulprojekt Mathe-Cool!* (Practical exercises)
Academic year 2010/2011	*Einführung in die Mathematik 1* (Exercises), *Seminar Problemlösen*, *Numerik partieller Differentialgleichungen* (Lecture, Exercises), *Mathematisches Schulprojekt Mathe-Cool!* (Practical exercises)
Academic year 2012/2013	*Lineare Algebra* (Exercises), *Numerische Verfahren für Differentialgleichungen I – Strukturerhaltende Algorithmen für gewöhnliche Differentialgleichungen* (Lecture), *Algebra II* (Exercises), *Numerik partieller Differentialgleichungen – Theorie und Anwendungen* (Lecture, Exercises), *Konversatorien zur Vorbereitung der ersten und zweiten Diplomprüfung im Lehramtsstudium*, *Mathematisches Schulprojekt Mathe-Cool!* (Practical exercises)

Academic year 2013/2014	*Lineare Algebra* (Exercises), *Seminar Teilgebiete der Mathematik: Mathematische Modelle in der Bildverarbeitung und deren numerische Lösung, Modellierung mit partiellen Differentialgleichungen* (Lecture, Exercises), *Seminar mit Bachelorarbeit, Konversatorien zur Vorbereitung der ersten und zweiten Diplomprüfung im Lehramtsstudium, Mathematisches Schulprojekt Mathe-Cool!* (Practical exercises)
Academic year 2014/2015	*Stochastische partielle Differentiagleichungen I* (Lecture, Exercises), *Mathematische Grundlagen der Quantenmechanik* (Lecture, Exercises), *Modellierung mit partiellen Differentialgleichungen* (Lecture, Exercises), *Seminar Modelle der nichtlinearen Akustik und deren numerische Lösung, Konversatorien zur Vorbereitung der ersten und zweiten Diplomprüfung im Lehramtsstudium, Mathematisches Schulprojekt Mathe-Cool!* (Practical exercises)
Academic year 2015/2016	*Stochastische partielle Differentiagleichungen II* (Lecture, Exercises), *Operatortheorie I* (Lecture, Exercises), *Spektraltheorie und Anwendungen in der Quantenmechanik* (Lecture), *Numerical methods for models in atmospheric sciences* (Lecture, Exercises), *Forschungsseminar Angewandte Mathematik, Konversatorien zur Vorbereitung der ersten und zweiten Diplomprüfung im Lehramtsstudium, Mathematisches Schulprojekt Mathe-Cool!* (Practical exercises)
Academic year 2016/2017	*Grundlagen der Operatortheorie* (Lecture, Exercises), *Stochastische partielle Differentiagleichungen* (Lecture, Exercises), *Spektraltheorie und Anwendungen in der Quantenmechanik* (Lecture), *Numerical methods for models in atmospheric sciences* (Lecture, Exercises), *Seminar Teilgebiete der Mathematik: Differentialgleichungen und Anwendungen, Konversatorien zur Vorbereitung der ersten und zweiten Diplomprüfung im Lehramtsstudium, Mathematisches Schulprojekt Mathe-Cool!* (Practical exercises)
Academic year 2017/2018	*Partielle Differentialgleichungen* (Lecture, Exercises), *Stochastische partielle Differentiagleichungen* (Lecture, Exercises), *Spektraltheorie und Anwendungen in der Quantenmechanik* (Lecture), *Numerical methods for models in atmospheric sciences* (Lecture), *Forschungsseminar Nichtlineare Akustik, Konversatorium zur Vorbereitung der zweiten Diplomprüfung im Lehramtsstudium, Mathematisches Schulprojekt Mathe-Cool!* (Practical exercises)
Academic year 2018/2019	*Partielle Differentialgleichungen* (Lecture, Exercises), *Stochastik* (Lecture), *Seminar für Lehramtsstudierende: Analysis, Stochastik, Numerik, Seminar für Lehramtsstudierende: Stochastik, Mathematisches Schulprojekt Mathe-Cool!* (Practical exercises)
Academic year 2019/2020	*Lineare Algebra I* (Lecture), *Algebra und diskrete Mathematik* (Exercises), *Seminar Kritische Forschungsanalyse: Lineare Algebra und maschinelles Lernen aus Daten, Seminar für Lehramtsstudierende: Analysis, Stochastik, Numerik, Seminar Mathe-Cool! im WS 2019/20 und im SS 2020*

Academic year 2020/2021	*Analysis und Stochastik im Schulunterricht* (Lecture), *Analysis 1* (Exercises), *Seminar mit Bachelorarbeit*
Academic year 2021/2022	*Analysis 1 & 2* (Exercises), *Lineare Algebra und Analytische Geometrie* (Exercises), *Partielle Differentialgleichungen* (Exercises), *Seminar mit Bachelorarbeit*
Academic year 2022/2023	*Numerische Mathematik 1 & 2* (Lecture, Exercises), *Lineare Algebra* (Exercises), *Lineare Algebra und Analytische Geometrie* (Exercises), *Seminar mit Bachelorarbeit*

Other teaching activities

Academic year 2001/2002	*Analyse Numérique* (Lecture, Exercises, Practical exercises), Université de Genève
Academic year 2002/2003/2004	*Mathematik 1 & 2* (Lecture), Private Universität für Medizinische Informatik und Technik Tirol (UMIT)
Academic year 2003/2004	*Mathematik 1 & 2* (Lecture), *Mathematik 3 – Numerische Mathematik* (Lecture), Private Universität für Medizinische Informatik und Technik Tirol (UMIT)
Academic year 2011/2012	*Numerische Mathematik I* (Autumn and spring trimester 2011/12, Lecture, Exercises), *Numerische Mathematik II* (Winter trimester 2012, Lecture, Exercises), Universität der Bundeswehr München

Lecture notes (Universität Innsbruck)

Time-splitting spectral methods for nonlinear Schrödinger equations (2009, revised and amended versions 2010, 2011, 2013).
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_SplittingSpectral.pdf

Numerische Verfahren für Differentialgleichungen I – Strukturerhaltende Algorithmen für gewöhnliche Differentialgleichungen (2012).
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_NumerikDgln.pdf

Mathematische Modellierung mit gewöhnlichen und partiellen Differentialgleichungen (2014, revised version 2015).
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_Modellierung.pdf

Mathematische Grundlagen der Quantenmechanik, Spektraltheorie und Anwendungen in der Quantenmechanik (2015, revised versions 2017, 2018).
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_Spektraltheorie.pdf

Stochastische partielle Differentialgleichungen I-II (2015, 2016, revised versions 2017, 2018).
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_SPDEs.pdf

Numerical methods for models in atmospheric sciences (2016, revised versions 2017, 2018).
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_AtmosphericScs.pdf

Operatortheorie (2016, revised versions 2017).
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_Operatortheorie.pdf

Partielle Differentialgleichungen (2018, revised version 2019).
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_PDEsKompendium.pdf
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_PDEsIllustrationen.pdf

Stochastik (2019).
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_StochastikTeil1.pdf
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_StochastikTeil2.pdf

Numerische Mathematik (2023).
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_Numerik12.pdf

Lecture notes (Universität der Bundeswehr München)

Numerische Mathematik I-II (2011).
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_Numerik1.pdf
techmath.uibk.ac.at/mecht/MyHomepage/Teaching/Lecture_Numerik2.pdf

Spring school

Spring School on *Analytical and Numerical Aspects of Evolution Equations 2009* (Berlin, Germany) organised by E. Emmrich and P. Wittbold. Lecture on *Time-splitting spectral methods for nonlinear Schrödinger equations*.
techmath.uibk.ac.at/mecht/MyHomepage/Research/SpringSchool_2009_Berlin.pdf

Activities for teachers

1. *Mathe-Cool! Spielerische Methoden für den Mathematikunterricht.* Fortbildung an der Pädagogischen Hochschule Tirol für Lehrende an Volksschulen und Mittelschulen. Joint activity with Wolfgang Förg–Rob, Daniela Schiefeneder, Helmut Wiederin. November 2019.
2. *Mathe-Cool! für alle Generationen zum Mitmachen für Daheim.* Fortbildungen an der Pädagogischen Hochschule Tirol für Lehrende an Volksschulen, Mittelschulen und Gymnasien. April 2021, November 2021, April 2022, November 2022, Mai 2023, November 2023.

4 Diploma, doctoral, and post-doctoral students

Abhau Jochen	Post-doctoral student (2010–2011).
Baloumis Nikolaos	Diploma thesis *Nonlinear operator equations and applications in elasto-viscoplastic dynamics* (Masterstudium Mathematik, 2019).
Belina Jessica	Diploma thesis *Dynamische Systeme zur Modellierung von Synchronisationsphänomenen. Wie lassen sich digitale Technologien zu deren Lösung einsetzen?* (Lehramtsstudium Mathematik, 2022).
Brugger Hannes	Diploma thesis *Problemlösen 2.0. Erforschung von "Computational Thinking" unterstützenden Maßnahmen in Hinblick auf den Mathematikunterricht* (Lehramtsstudium Mathematik, 2021).
Bußlehner Ingrid	Diploma thesis *Die numerische Interpolation und ihre Einbindung in den Schulunterricht* (Lehramtsstudium Mathematik, 2012).
Canham Louise	Diploma thesis *A statistical analysis of the gender gap in mathematics achievement in the Austrian school leaving examination / Eine statistische Analyse des Geschlechtsunterschiedes der Leistungen im Fach Mathematik bei der österreichischen Matura* (Lehramtsstudium Mathematik, 2020).
Complojer Lisa	Diploma thesis *Quadratische Funktionen im historischen Kontext* (Lehramtsstudium Mathematik, 2022).
Ümmü Ersoysal	Diploma thesis *Magnus-Entwicklung und Anwendungen auf Differentialgleichungen* (Masterstudium Mathematik, 2021).
Eder Chiara	Diploma thesis *Sprache und Mathematikunterricht. Die Bedeutung der Sprache im Mathematikunterricht und das Potential von bilingualem Mathematikunterricht anhand konkreter Beispiele der Sekundarstufe II* (Lehramtsstudium Mathematik, 2022).
Fleisch Ruth	Diploma thesis *Ordnungsbedingungen für Splitting-Verfahren bei Anwendung auf Differentialgleichungen mit drei Anteilen* (Diplomstudium Mathematik, 2010).
Förg-Rob Philipp	Diploma thesis *Approximation unter Betrachtung der Splineinterpolation — Einbindung des Themas in den Schulunterricht* (Lehramtsstudium Mathematik, 2016).
Fraydenegg Thomas	Diploma thesis *Computeralgebrasysteme (CAS) im Mathematikunterricht der Sekundarstufe* (Lehramtsstudium Mathematik, 2019).
Gasser Magdalena	Diploma thesis *Sprachsensibler Mathematikunterricht – Untersuchungen am Beispiel ausgewählter Themen der Sekundarstufe* (Lehramtsstudium Mathematik, 2019).
Graml Simone	Diploma thesis *Numerik in der Schule – Nichtlineare Gleichungen* (Lehramtsstudium Mathematik, 2008).
Hafele Jakob	Diploma thesis *Finanz-und Wirtschaftsmathematik im Schulunterricht* (Lehramtsstudium Mathematik, 2021).

Haid Sabrina	Diploma thesis *Bedeutende Persönlichkeiten der Mathematik und ihre Erkenntnisse – Konzepte zur Behandlung im Schulunterricht* (Lehramtsstudium Mathematik, 2020).
Juen Markus	Diploma thesis *Zahlen im Wandel – Die Entwicklung des Zahlbegriffs in der Schullaufbahn von der Volksschule bis zur Matura* (Lehramtsstudium Mathematik, 2017).
Kassebacher Thomas	Doctoral thesis *Splitting methods for nonlinear Schrödinger equations* (2015).
Kirchmair Martin	Diploma thesis *Der Weg der Stochastik in den Schulunterricht* (Lehramtsstudium Mathematik, 2019).
Kremser Marion	Diploma thesis *Der Einsatz von Mikrocontrollern im Mathematikunterricht als Einstieg in die Differentialrechnung* (Lehramtsstudium Mathematik, 2019).
Luschin Theresa	Diploma thesis *Regressionsanalyse – Ein theoretischer sowie anwendungsbezogener Zugang für den Schulunterricht* (Lehramtsstudium Mathematik, 2015).
Macht Magdalena	Diploma thesis *Die Notwendigkeit zur Approximation und deren Umsetzung im Schulunterricht des 21. Jahrhunderts* (Lehramtsstudium Mathematik, 2018).
Maier Sarah	Diploma thesis *Das Potential fächerübergreifenden Mathematikunterrichts anhand ausgewählter Themen aus Geographie und Wirtschaftskunde* (Lehramtsstudium Mathematik, 2019).
Mair Tobias	Diploma thesis *Mathematische Erkenntnisse der antiken Astronomie und ihre Vermittlung im Schulunterricht: Abstandsbestimmung zwischen Sonne, Mond und Erde nach Aristarch von Samos* (Lehramtsstudium Mathematik, 2020).
Mantinger Jonas	Diploma thesis *Maschinelles Lernen – Grundlagen des Maschinellen Lernens und algorithmische Umsetzung mit Python in Hinblick auf den Schulunterricht* (Lehramtsstudium Mathematik, 2019).
Markt Gabriela	Diploma thesis *Location based Gamification zur interaktiven Vermittlung von mathematischen Lerninhalten* (Lehramtsstudium Mathematik, 2019).
Mayr Julia	Diploma thesis *Grenzwerte von Funktionen – Ein Vergleich der Lehrpläne von Österreich und Südtirol* (Lehramtsstudium Mathematik, 2017).
Meraner Melanie	Diploma thesis *Manipulation und mögliche Fehlerquellen in Statistiken – aufgezeigt an Beispielen aus der Biologie und aufbereitet für den Schulunterricht* (Lehramtsstudium Mathematik, 2020).
Mittermair Sonja	Diploma thesis *Symmetrie und Selbstähnlichkeit in der Natur und die Einbindung in den Mathematikunterricht* (Lehramtsstudium Mathematik, 2020).
Neuhauser Christof	Doctoral thesis *Space and time integration of nonlinear Schrödinger equations* (2010).
Pali Marie-Christine	Master thesis *Introductory concepts in fluid dynamics with applications to geophysics* (Masterstudium Mathematik, 2017).

Piazzolla Monica	Diploma thesis *Wachstumsprozesse: Mathematische Modellierung biologischer Vorgänge und ihre Kontextualisierung im Schulunterricht* (Lehramtsstudium Mathematik, 2019).
Pohler Mirjam	Diploma thesis *Die Welt der Grenzwerte und ihre Einbindung in den Mathematikunterricht* (Lehramtsstudium Mathematik, 2015).
Rauchegger Sabrina	Diploma thesis *Einsatz neuer Medien im Mathematikunterricht* (Lehramtsstudium Mathematik, 2018).
Schretter Barbara	Master thesis *Operator splitting and finite element methods for the nonlinear Westervelt equation* (Masterstudium Mathematik, 2017).
Stofner Maria	Diploma thesis *Berge sind keine Kegel – Fraktale Geometrie im Mathematikunterricht* (Lehramtsstudium Mathematik, 2015).
Traxl Johannes	Diploma thesis *Implementierung von Spektralverfahren zur räumlichen Diskretisierung von Schrödingergleichungen mittels Python* (Diplomstudium Mathematik, 2011).
Vorhauser Verena	Diploma thesis *Eine fächerübergreifende Einführung der Differentialrechnung im Mathematik- und Sportunterricht* (Lehramtsstudium Mathematik, 2020).

5 Publications and other contributions

See also techmath.uibk.ac.at/mecht/MyHomepage/Publications.html

Publications

1. A. Ostermann, M. Thalhammer,
   Non-smooth data error estimates for linearly implicit Runge-Kutta methods.
   IMA J. Numer. Anal. 20 (2000) 167–184.
   techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper01.pdf
2. C. González, A. Ostermann, C. Palencia, M. Thalhammer,
   Backward Euler discretization of fully nonlinear parabolic problems.
   Math. Comp. 71 (2001) 125–145.
   techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper02.pdf
3. A. Ostermann, M. Thalhammer,
   Convergence of Runge-Kutta methods for nonlinear parabolic equations.
   Applied Numerical Math. 42 (2002) 367–380.
   techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper03.pdf
4. A. Ostermann, M. Thalhammer, G. Kirlinger,
   Stability of linear multistep methods and applications to nonlinear parabolic problems.
   Applied Numerical Math. 48 (2004) 389–407.
   techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper04.pdf
5. M. Thalhammer,
   On the convergence behaviour of variable stepsize multistep methods for singularly perturbed problems.
   BIT Numer. Math. 44 (2004) 343–361.
   techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper05.pdf
6. C. González, A. Ostermann, M. Thalhammer,
   A second-order Magnus integrator for nonautonomous parabolic problems.
   J. Comp. Appl. Math. 189 (2006) 142–156.
   techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper06.pdf
7. C. González, M. Thalhammer,
   A second-order Magnus type integrator for quasilinear parabolic problems.
   Math. Comp. 76/257 (2007) 205–231.
   techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper07.pdf
8. A. Ostermann, M. Thalhammer, W. Wright,
   A class of explicit exponential general linear methods.
   BIT Numer. Math. 46 (2006) 409–431.
   techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper08.pdf
9. M. Thalhammer,
   A fourth-order commutator-free exponential integrator for non-autonomous differential equations.
   SIAM J. Numer. Anal. 44/2 (2006) 851–864.
   techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper09.pdf
10. M. Thalhammer,
    High-order exponential operator splitting methods for time-dependent Schrödinger equations.
    SIAM J. Numer. Anal. 46/4 (2008) 2022–2038.
    techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper10.pdf

11. M. Caliari, Ch. Neuhauser, M. Thalhammer,
High-order time-splitting Hermite and Fourier spectral methods for the Gross–Pitaevskii equation.
J. Comput. Phys. 228 (2009) 822–832.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper11.pdf
12. M. Caliari, A. Ostermann, S. Rainer, M. Thalhammer,
A minimisation approach for computing the ground state of Gross–Pitaevskii systems.
J. Comput. Phys. 228 (2009) 349–360.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper12.pdf
13. Ch. Neuhauser, M. Thalhammer,
On the convergence of splitting methods for linear evolutionary Schrödinger equations involving an unbounded potential.
BIT Numer. Math. 49 (2009) 199–215.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper13.pdf
14. S. Descombes, M. Thalhammer,
An exact local error representation of exponential operator splitting methods for evolutionary problems and applications to linear Schrödinger equations in the semi-classical regime.
BIT Numer. Math. 50 (2010) 729–749.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper14.pdf
15. E. Emmrich, M. Thalhammer,
Stiffly accurate Runge–Kutta methods for nonlinear evolution problems governed by a monotone operator.
Math. Comp. 79 (2010) 785–806.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper15.pdf
16. E. Emmrich, M. Thalhammer,
Convergence of a time discretisation for doubly nonlinear evolution equations of second order.
Found. Comput. Math. 10 (2010) 171–190.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper16.pdf
17. E. Emmrich, M. Thalhammer,
Doubly nonlinear evolution equations of second order: Existence and fully discrete approximation.
J. Diff. Equ. 251 (2011) 82–118.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper17.pdf
18. E. Emmrich, M. Thalhammer,
A class of integro-differential equations incorporating nonlinear and nonlocal damping with applications in nonlinear elastodynamics: Existence via time discretization.
Nonlinearity 24 (2011) 2523–2546.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper18.pdf
19. W. Auzinger, O. Koch, M. Thalhammer,
Defect-based local error estimators for splitting methods, with application to Schrödinger equations. Part I. The linear case.
J. Comput. Appl. Math. 236 (2012) 2643–2659.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper19.pdf
20. M. Thalhammer, J. Abhau,
A numerical study of adaptive space and time discretisations for Gross–Pitaevskii equations.
J. Comput. Phys. 231 (2012) 6665–6681.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper20.pdf

21. M. Thalhammer,
Convergence analysis of high-order time-splitting pseudo-spectral methods for nonlinear Schrödinger equations.
SIAM J. Numer. Anal. 50/6 (2012) 3231–3258.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper21.pdf
22. S. Descombes, M. Thalhammer,
The Lie–Trotter splitting for nonlinear evolutionary problems with critical parameters: A compact local error representation and application to nonlinear Schrödinger equations in the semiclassical regime.
IMA J. Numer. Anal. 33/2 (2013) 722–745.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper22.pdf
23. O. Koch, Ch. Neuhauser, M. Thalhammer,
Embedded exponential operator splitting methods for the time integration of nonlinear evolution equations.
Appl. Numer. Math. 63 (2013) 14–24.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper23.pdf
24. O. Koch, Ch. Neuhauser, M. Thalhammer,
Error analysis of high-order splitting methods for nonlinear evolutionary Schrödinger equations and application to the MCTDHF equations in electron dynamics.
M2AN 47/5 (2013) 1265–1286.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper24.pdf
25. W. Auzinger, O. Koch, M. Thalhammer,
Defect-based local error estimators for splitting methods, with application to Schrödinger equations. Part II. Higher-order methods for linear problems.
J. Comput. Appl. Math. 255 (2014) 384–403.
techmath.uibk.ac.at/mecht/MyHomepage/Publications/MyPaper25.pdf
26. J. Gwinner, M. Thalhammer,
Full discretisations for nonlinear evolutionary inequalities based on stiffly accurate Runge–Kutta and hp-finite element methods.
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27. H. Hofstätter, O. Koch, M. Thalhammer,
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28. B. Kaltenbacher, V. Nikolić, M. Thalhammer,
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30. W. Auzinger, O. Koch, M. Thalhammer,
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33. Ph. Chartier, F. Méhats, M. Thalhammer, Y. Zhang,
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Higher-order exponential integrators for quasi-linear parabolic problems. Part II. Convergence.
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36. W. Auzinger, Th. Kassebacher, O. Koch, M. Thalhammer,
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39. S. Blanes, F. Casas, M. Thalhammer,
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43. S. Blanes, F. Casas, M. Thalhammer,
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44. Ph. Bader, S. Blanes, F. Casas, M. Thalhammer,
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2. W. Fellin, M. Mergili, A. Ostermann, K. Schratz, M. Thalhammer,
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3. W. Auzinger, O. Koch, M. Thalhammer,
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4. W. Auzinger, W. Herfort, O. Koch, M. Thalhammer,
The BCH-formula and order conditions for splitting methods.
In: Lie Groups, Differential Equations, and Geometry, G. Falcone (editor), Springer 2017, p. 71–83.
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Diploma, doctoral, and habilitation thesis

Die numerische Behandlung freier Randwertprobleme.
Diploma thesis, 1997. Supervisor: A. Ostermann.

Runge-Kutta Time Discretization of Fully Nonlinear Parabolic Problems.
Doctoral thesis, 2000. Supervisor: A. Ostermann.

Time Integration of Differential Equations.
Habilitation thesis, 2006.
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6 Research grants and other funding

Research grants

1. *Diskretisierung partieller Differentialgleichungen.* Charlotte–Bühler–Programm des Fonds zur Förderung der wissenschaftlichen Forschung (FWF). Period: March 1 – September 30, 2005.
2. *Analysis von Zeitdiskretisierungen nichtlinearer parabolischer Gleichungen.* Deutsche Forschungsgemeinschaft (DFG). Travel grant, joint project with E. Emmrich (Technische Universität Berlin). Period: October 1 – December 31, 2008.
3. *Diskretisierung nichtlinearer Evolutionsgleichungen.* Deutsche Forschungsgemeinschaft (DFG). Travel grant, joint project with E. Emmrich (Technische Universität Berlin). Period: May 1 – July 31, 2009.
4. *Analysis von Diskretisierungen nichtlinearer Evolutionsgleichungen zweiter Ordnung.* Deutsche Forschungsgemeinschaft (DFG). Travel grant, joint project with E. Emmrich (Technische Universität Berlin). Period: October 1, 2009 – March 31, 2010.
5. *Numerical methods for nonlinear Schrödinger equations.* Fonds zur Förderung der wissenschaftlichen Forschung (FWF). Period: October 1, 2009 – September 30, 2012 (prolonged to September 30, 2014).
6. *LODIQUAS – Modeling and Numerical Simulation of Low Dimensional Quantum Systems.* Agence nationale de la recherche (ANR), Blanc International II Programme. Project coordinators: N. Mauser (Austria), F. Castella (France). Austrian investigators: N. Mauser, E. Gornik, M. Thalhammer. Period: April 1, 2012 – March 30, 2015 (prolongation to December 2015). Total funding 398.888 Euro.
7. *Effiziente Zeitintegrationsverfahren für nichtlineare Evolutionsgleichungen.* Tiroler Wissenschaftsfonds (TWF). Employee Barbara Schretter. Period: January 1, 2017 – June 30, 2017.
8. Grant of the *BritInn Fellowship Programme* to host José Antonio Carrillo (Oxford, United Kingdom), 2020.

Participation in research projects

1. *The long-time behaviour of discretizations of parabolic evolution equations.* Acciones Integradas (Austria – Spain 1998/99). Project of A. Ostermann (Universität Innsbruck) and C. Palencia (Universidad de Valladolid). Period: January 1, 1998 – December 31, 1999.
2. *Zeitdiskretisierung nichtlinearer parabolischer Evolutionsgleichungen.* Fonds zur Förderung der wissenschaftlichen Forschung. Project of A. Ostermann (Universität Innsbruck). Period: December 1, 1999 – November 20, 2001.
3. *Numerical analysis of deterministic systems through stochastic techniques.* Acciones Integradas (Austria – Spain 2002/03). Project of A. Ostermann (Universität Innsbruck) and C. Palencia (Universidad de Valladolid). Period: January 1, 2002 – December 31, 2003.
4. *Innovative concepts for nonlinear analysis of lightweight structures.* TransIT, Intales. Project of M. Oberguggenberger and A. Ostermann (Universität Innsbruck). Period: 2006 – 2007 (18 months).
5. *Advanced concept for structure analysis of large lightweight structures.* FFG, Intales. Project of M. Oberguggenberger and A. Ostermann (Universität Innsbruck). Period: 2008 – 2009 (18 months).

6. *Geometric numerical integrators for quantum problems, celestial mechanics and Monte Carlo simulations (GNI-QUAMC)*. Agencia Estatal de Investigación, PID2019-104927GB-C21. Approved 2020. Project coordinator: Fernando Casas (Castellón, Spain).
7. *New applications of geometric numerical integrators to evolution problems, stochastic differential equations and Hamiltonian Monte Carlo simulations (GNIESDIFF)*. Agencia Estatal de Investigación, PID2022-136585NB-C21. Approved 2023. Project coordinator: Fernando Casas (Castellón, Spain).

Other funding

1. *Mathematik geht an die Schule.* Joint project with N. Netzer and W. Förg–Rob, 2007 – 2009.
2. *MATHE–Cool!* Joint project with N. Netzer and W. Förg–Rob, 2010/2011, funded by the *Bundesministerium für Wissenschaft und Forschung.*
3. *Sommerpraktikum Mathe-Cool!* Project funded by FFG (Talente – Praktika für Schülerinnen und Schüler). Joint application with Wolfgang Förg–Rob and Daniela Schiefeneder. Project collaborators Hannah Gschwentner, Bernard Putzer. Period: June 1 – September 30, 2018.
4. *Sommerpraktikum Mathe-Cool!* Project funded by FFG (Talente – Praktika für Schülerinnen und Schüler). Joint application with Wolfgang Förg–Rob and Daniela Schiefeneder. Project collaborators Daniel Larch, Miriam Redinger. Period: June 1 – September 30, 2019.

See also mathecool.uibk.ac.at

7 Contributions to conferences

Organisation of conferences

1. Assistance in the organisation of the meeting *Workshop on Exponential Integrators 2004* (Innsbruck, Austria) organised by A. Ostermann.
2. Assistance in the organisation of the meeting *Workshop on Computational Life Sciences 2005* (Innsbruck, Austria) organised by A. Ostermann.
3. Assistance in the organisation of the meeting *Innovative Integrators for Differential and Delay Equations 2006* (Innsbruck, Austria) organised by A. Ostermann.
4. Assistance in the organisation of the meeting *Time Integration of Evolution Equations 2007* (Innsbruck, Austria) organised by A. Ostermann.
5. Assistance in the organisation of the meeting *Splitting Methods in Time Integration 2008* (Innsbruck, Austria) organised by A. Ostermann.
6. Assistance in the organisation of the meeting *Austrian Numerical Analysis Day 2009* (Innsbruck, Austria) organised by A. Ostermann.
7. Workshop *Two Days on Splitting Methods for Evolution Equations 2010* (Innsbruck, Austria), funded by the *Frankreich-Schwerpunkt – Le Pôle interdisciplinaire d'études françaises* of the University of Innsbruck.
8. Organisation of conference *Austrian Numerical Analysis Day 2018* (Klagenfurt, Austria) together with Barbara Kaltenbacher, Elena Resmerita, Anita Wachter.
   anaday2018.aau.at
9. Organisation of the meeting *First Austrian Day of Women in Mathematics 2021* (virtual event) together with the team of A^2WiM.
   sites.google.com/view/adwim/home
10. Organisation of the meeting *Second Austrian Day of Women in Mathematics 2022* (virtual event) together with the team of A^2WiM.
    sites.google.com/view/adwim-2022/home
11. Organisation of the meeting *Third Austrian Day of Women in Mathematics 2023* (virtual event) together with the team of A^2WiM.
    sites.google.com/view/adwim-2023/home
12. Organisation of the meeting *Fourth Austrian Day of Women in Mathematics 2024* (member of the scientific committee).
    sites.google.com/view/adwim2024/home

Organisation of special sessions and minisymposia

1. SciCADE 2007 (Saint Malo, France), Minisymposium on *Nonlinear evolution equations.*
2. ICIAM 2007 (Zürich, Switzerland), Minisymposium on *Time integration of evolution equations*, organised together with A. Ostermann.
3. 9th AIMS Conference on Dynamical Systems, Differential Equations and Applications 2012 (Orlando, Florida, USA), Special session on *Advances in the numerical solution of nonlinear evolution equations.*
4. IFIP TC7/2013 System Modelling and Optimization (Klagenfurt, Austria), Minisymposium on *Nonsmooth and unilateral problems – modelling, analysis and optimisation methods*, organised together with J. Gwinner.

5. 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications 2014 (Madrid, Spain), Special session on *Advances in the numerical solution of nonlinear evolution equations*.
6. 9th International Conference on Computational Physics 2015 (Singapore), Minisymposium on *Numerical simulation of quantum and kinetic problems*, organised together with Weizhu Bao and Mohammed Lemou.
7. SciCADE 2015 (Potsdam), Minisymposium on *Stochastic partial differential equations: Analytical and numerical aspects*, organised together with Erika Hausenblas and Sylvie Roelly.
8. 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications 2016 (Orlando, Florida, USA), Special session on *Advances in the numerical solution of nonlinear evolution equations*, organised together with Winfried Auzinger.
9. International Congress on Industrial and Applied Mathematics 2019 (Valencia, Spain), Minisymposium on *Nonlinear acoustics: analytical and numerical aspects*, organised together with Barbara Kaltenbacher.
10. International Congress on Industrial and Applied Mathematics 2019 (Valencia, Spain), Minisymposium on *Advanced numerical methods for differential equations*, organised together with Philippe Chartier and Mohammed Lemou.
11. 14th International Conference on Mathematical and Numerical Aspects of Wave Propagation 2019 (Vienna, Austria), Minisymposium on *Nonlinear acoustics: analytical and numerical aspects*, organised together with Barbara Kaltenbacher.
12. Computational Methods in Applied Mathematics 2020 (Vienna, Austria), Minisymposium on *Stochastic partial differential equations: Analytical and numerical aspects*, organised together with Erika Hausenblas. (Deferred to 2022.)
13. Annual meeting of DMV–ÖMG 2021 (virtual event), Minisymposium on *Connecting young researchers by networks*, organised together with Veronika Pillwein.
14. Annual meeting of ÖMG 2023, Minisymposium on *Theory and numerics of evolution equations*, organised together with Barbara Kaltenbacher.

Organisation of working groups

1. Wolfgang Pauli Institute (Vienna, June 22–26, 2015), Working group on *Efficient numerics for nonlinear Schrödinger equations*, organised together with Norbert Mauser.
2. Wolfgang Pauli Institute (Vienna, March 7–10, 2017), Working group on *Efficient numerical methods for quantum systems*, organised together with Norbert Mauser.
3. Wolfgang Pauli Institute (Vienna, February 6–9, 2018), Working group on *Novel approaches for adaptive time integration and application to Gross–Pitaevskii equations*, organised together with Norbert Mauser.
4. Wolfgang Pauli Institute (Vienna, February 25 – March 1, 2019), Working group on *Adaptive operator splitting methods and applications to Schrödinger and kinetic equations*, organised together with Norbert Mauser.
5. Wolfgang Pauli Institute (Vienna, January 27 – 31, 2020), Working group on *Schrödinger and kinetic equations*, organised together with Sergio Blanes.
6. Wolfgang Pauli Institute (Vienna, May 22 – 24, 2023), Working group on *Operator splitting methods and beyond*, organised together with Fernando Casas.

Plenary talk

International conference on scientific computation and differential equations (SciCADE) 2011 (Toronto, Canada), *Favourable space and time discretisations for nonlinear Schrödinger equations.*

Communications at conferences

1. ICM 1998 (Berlin, Germany), *Non-smooth data error estimates for linearly-implicit Runge-Kutta methods.*
2. 18th Biennial Conference on Numerical Analysis 1999 (Dundee, Scotland, UK), *Non-smooth data error estimates for linearly-implicit Runge-Kutta methods and applications to long-term behaviour.*
3. Euroconference on Numerical Methods for Evolution Partial Differential Equations 2000 (Anogia, Crete), *Runge-Kutta time discretization of nonlinear parabolic problems.*
4. 19th Biennial Conference on Numerical Analysis 2001 (Dundee, Scotland, UK), *Multistep methods for fully nonlinear parabolic equations - how do they behave?*
5. SciCADE 2001 (Vancouver, Canada), *Convergence and long-term behaviour of time discretizations for fully nonlinear parabolic problems.*
6. 15. ÖMG-Kongress & Jahrestagung der Deutschen Mathematikervereinigung 2001 (Vienna, Austria), *The numerics of nonlinear parabolic problems.*
7. Conference on Scientific Computation 2002 (Geneva, Switzerland), *Some qualitative aspects of nonlinear evolution equations under time discretization.*
8. Workshop on Innovative Time Integration for PDEs 2002 (Amsterdam, The Netherlands), *Stability of linear multistep methods and applications to nonlinear parabolic problems.*
9. SciCADE 2003 (Trondheim, Norway), *On the convergence behaviour of variable stepsize multistep methods for singularly perturbed problems.*
10. 10th Seminar NUMDIFF on Numerical Solution of Differential and Differential-Algebraic Equations 2003 (Halle, Germany), *Convergence of variable stepsize linear multistep methods for singular perturbation problems.*
11. 8. Österreichisches Mathematikertreffen & Nachbarschaftstagung in Kooperation mit SIMAI und UMI 2003 (Bolzano, Italy), *Variable stepsize linear multistep discretizations of singular perturbation problems.*
12. ICCAM 2004 (Leuven, Belgium), *A second-order Magnus integrator for non-autonomous parabolic problems.*
13. Workshop on Exponential Integrators 2004 (Innsbruck, Austria), *On the convergence behaviour of a second-order Magnus integrator for linear non-autonomous parabolic problems.*
14. MaGIC 2005 (Ustaoset, Norway), *Magnus type integrators for nonlinear parabolic problems.*
15. Austrian Numerical Analysis Day 2005 (Obergurgl, Austria), *Exponential and Magnus integration methods for the time discretisation of evolution equations.*
16. ENUMATH 2005 (Santiago de Compostela, Spain), *A class of explicit exponential general linear methods.*
17. ICDE 2005 (Zürich, Switzerland), *Exponential time integration schemes for semilinear initial-boundary value problems.*
18. Austrian Numerical Analysis Day 2006 (Graz, Austria), *Exponential integrators for parabolic initial-boundary value problems.*
19. Workshop on Innovative Integrators for Differential and Delay Equations 2006 (Innsbruck, Austria), *Exponential integration methods for evolution equations.*
20. SciCADE 2007 (Saint Malo, France), *Time-splitting spectral methods for the Gross–Pitaevskii equation.*

21. 6th International Congress on Industrial and Applied Mathematics (ICIAM) 2007 (Zürich, Switzerland), *High-order splitting methods for linear and nonlinear Schrödinger equations.*
22. Workshop on Time Integration of Evolution Equations 2007 (Innsbruck, Austria), *On the convergence of high-order splitting for linear and nonlinear Schrödinger equations.*
23. MaGIC 2008 (Renon, Bolzano, Italy), *Time-splitting spectral methods for nonlinear Schrödiger equations.*
24. Nonlinear Degenerate Quantum Gases (NLQUGAS) 2008 (Toledo, Spain), *On the convergence of the Strang time-splitting Hermite spectral method for nonlinear Schrödiger equations.*
25. Austrian Numerical Analysis Day 2008 (Linz, Austria), *On the error behaviour of exponential operator splitting methods for nonlinear Schrödinger equations.*
26. 3rd Workshop on Stability and Discretization Issues in Differential Equations (SDIDE) 2008 (Vienna, Austria), *On the stability and convergence of exponential operator splitting methods for evolutionary Schrödinger equations.*
27. Workshop on Splitting Methods in Time Integration 2008 (Innsbruck, Austria), *Exponential operator splitting methods for evolutionary nonlinear Schrödinger equations.*
28. Vienna Conference on Mathematical Modelling (MATHMOD) 2009 (Vienna, Austria), *Advanced integration methods for nonlinear Schrödinger equations.*
29. Conference on Scientific Computing 2009 (Geneva, Switzerland), *Local error expansions for high-order exponential operator splitting methods.* Talk within the minisyposium on *Splitting methods for stiff and nonstiff problems* organised by S. Descombes and M. Massot.
30. International Conference on Spectral and High Order Methods (ICOSAHOM) 2009 (Trondheim, Norway), *High-order time-splitting spectral methods for nonlinear Schrödinger equations.* Talk within the minisyposium on *High-order methods for linear and nonlinear wave equations* organised by W. Bao, J. Shen, and L.-L. Wang.
31. Mathematical Models of Quantum fluids – Geometrical, Analytical and Computational Aspects 2009 (Verona, Italy), *High-order time-splitting spectral methods for Gross–Pitaevskii systems.*
32. Workshop Two Days on Splitting Methods for Evolution Equations 2010 (Innsbruck, Austria), *Exponential operator splitting methods for the efficient time integration of nonlinear evolution equations.*
33. Austrian Numerical Analysis Day 2010 (Salzburg, Austria), *Embedded split-step formulae for the time integration of nonlinear evolution equations.*
34. A Symposium on Splitting Methods for Differential Equations 2010 (Castellón, Spain), *Are exponential operator splitting methods favourable for the time integration of evolutionary problems involving critical parameters?*
35. 8th International Conference of Numerical Analysis and Applied Mathematics (ICNAAM) 2010 (Rhodes, Greece), *On the error behaviour of splitting methods for a class of nonlinear Schrödinger equations.* Talk within the *Third Symposium on Recent Trends in the Numerical Solution of Differential Equations* organised by L. Brugnano and E. Weinmüller.
36. Workshop on Numerical Methods for stiff problems in Hamiltonian systems and kinetic equations 2011 (Saint Malo, France), *Error behaviour of splitting methods for nonlinear Schrödinger equations with critical parameters.*
37. Austrian Numerical Analysis Day 2011 (Klagenfurt, Austria), *Reliable time discretisations of Schrödinger equations with critical parameters.*
38. ICIAM 2011 (Vancouver, Canada), *High-order exponential operator splitting methods for nonlinear Schrödinger equations.* Talk within Minisymposium *Modeling, Analysis and Simulation for Degenerate Quantum Gases* organised by W. Bao, I-L. Chern, and Y. Zhang.
39. ÖMG–CSASC 2011 (Krems, Austria), *Adaptive space and time discretisations for nonlinear Schrödinger equations.*

40. Program on Multiscale Modeling, Simulation, Analysis and Applications, Workshop III, January 2012 (Singapore), *Adaptive time integration methods for Gross–Pitaevskii equations.*
41. GAMM 2012 (Darmstadt, Germany), *Adaptive exponential operator splitting methods for nonlinear evolution equations.*
42. Austrian Numerical Analysis Day 2012 (Vienna, Austria), *Stiffly accurate Runge–Kutta methods for nonlinear evolutionary equations and inequalities.*
43. The 9th AIMS Conference on Dynamical Systems, Differential Equations and Applications 2012 (Orlando, Florida, USA), *Favourable discretisations for low-dimensional nonlinear Schrödinger equations.*
44. Workshop on Low dimensional Quantum Systems 2012 (Vienna, Austria), *Adaptive time integration methods for Gross–Pitaevskii equations.*
45. Workshop on Spectral Theory and Differential Operators 2012 (Graz, Austria), *Convergence analysis of high-order time-splitting pseudo-spectral methods for a class of nonlinear Schrödinger equations.*
46. 13th Seminar NUMDIFF on Numerical Solution of Differential and Differential-Algebraic Equations 2012 (Halle, Germany), *Adaptive space and time discretisations for Gross–Pitaevskii equations.*
47. Workshop on Confined Quantum Systems: Modeling, Analysis and Computation 2013 (Vienna, Austria), *Adaptive integration methods for time-dependent Gross–Pitaevskii equations: Theoretical and practical aspects.*
48. Workshop on Quantized vortices in superfluidity and superconductivity 2013 (Vienna, Austria), *Convergence analysis of high-order time-splitting pseudo-spectral methods for rotational Gross–Pitaevskii equations.*
49. ENUMATH 2013 (Lausanne, Switzerland), *Multi-revolution composition and operator-splitting pseudo-spectral methods for time-dependent Schrödinger equations.* Talk within Minisymposium *Asymptotic preserving schemes for highly oscillatory PDEs* organised by Ph. Chartier and M. Lemou.
50. IFIP 2013 (Klagenfurt, Austria), *Discretisations for nonlinear evolutionary equalities and inequalities based on stiffly accurate Runge–Kutta methods.* Talk within Minisymposium *Nonsmooth and Unilateral Problems – Modelling, Analysis and Optimisation Methods* organised together with J. Gwinner.
51. SCICADE 2013 (Valladolid, Spain), *Multi-revolution composition and operator-splitting pseudo-spectral methods for time-dependent Schrödinger equations.* Talk within Minisymposium *Splitting Methods* organised by F. Casas.
52. Workshop on Mathematical and numerical analysis of electronic structure models 2014 (Berlin, Germany), *Error analysis of operator splitting methods for nonlinear Schrödinger equations and application to the MCTDHF equations in electron dynamics.*
53. The 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications 2014 (Madrid, Spain), *Efficient time integration methods based on operator splitting and application to the Westervelt equation.* Talk within Special Session 108 on Mathematics of Nonlinear Acoustics organised by B. Kaltenbacher. *Convergence analysis of high-order commutator-free exponential integrators for non-autonomous linear evolution equations.* Talk within Special Session 63 on Advanced High Order Geometric Numerical Integration Methods for Differential Equations organised by S. Blanes and F. Casas.
54. LODIQUAS Seminar 2014 (St. Malo, France), *Efficient time integration methods based on operator splitting and application to the Westervelt equation.*
55. LODIQUAS Seminar 2015 (Dinard, France), *Convergence analysis of multi-revolution composition time-splitting spectral methods for highly oscillatory evolution equations.*

56. Stability and Discretization Issues in Differential Equations (SDIDE) 2016 (Trieste, Italy), *Design of commutator-free Magnus integrators for non-autonomous linear evolution equations.*
57. New Challenges in Mathematical Modelling and Numerical Simulation of Superfluids 2016 (CIRM, Marseille, France), *High-order commutator-free Magnus integrators for non-autonomous linear evolution equations.*
58. International Conference on Hyperbolic Problems – Theory, Numerics, Applications (HYP) 2016 (Aachen, Germany), *Time integration based on operator splitting and application to models from nonlinear acoustics.*
59. Workshop on Nonlinear Stochastic Evolution Equations: Analysis and Numerics 2016 (Berlin, Germany), *Commutator-free Magnus integrators and their areas of application.*
60. Workshop on Recent Contributions of Women to Partial Differential Equations 2016 (Vienna, Austria), *Commutator-free Magnus integrators combined with operator splitting methods and their areas of application.*
61. Workshop on Modern Numerical Methods for Quantum Mechanics 2017 (Polish Academy of Sciences, Warsaw, Poland), *Commutator-free quasi-Magnus exponential integrators combined with operator splitting methods and their areas of application.*
62. Workshop on Numerical methods for PDEs and their applications 2017 (Institut Mittag–Leffler, Djursholm, Stockholm, Schweden), *Favourable time integration methods for non-autonomous evolution equations.*
63. Foundations of Computational Mathematics 2017 (Barcelona, Spain), *Two approaches for the design of adaptive time-splitting methods.* Talk within workshop on Geometric Integration and Computational Mechanics organised by Fernando Casas, Elena Celledoni, David Martin de Diego.
64. Workshop on Advances in Mathematical Modelling and Numerical Simulation of Superfluids 2017 (Rouen, France), *Three approaches for the design of adaptive time-splitting methods.*
65. SciCADE 2017 (Bath, United Kingdom), *Favourable time integration methods for non-autonomous evolution equations.* Talk within invited minisymposium on Numerical integration of non-autonomous dynamical systems organised by Sergio Blanes.
66. 89th GAMM Annual Meeting 2018 (Munich, Germany), *Fundamental nonlinear wave equations arising in nonlinear acoustics: analytical and numerical aspects.*
67. Nonlinear and Nonlocal Evolution Equations and Stochastic Methods 2018 (Stralsund, Germany), *Nonlinear damped wave equations arising in high-intensity ultrasonics: analytical and numerical aspects.*
68. Modern Numerical Methods for Quantum Mechanics II, 2018 (Gdańsk, Poland), *Convergence analysis of commutator-free quasi-Magnus exponential integrators for non-autonomous linear Schrödinger equations.*
69. Nonlinear Stochastic Evolution Equations: Analysis, Numerics and Applications 2018 (Berlin, Germany), *Theoretical study and numerical simulation of pattern formation in reaction-diffusion systems.*
70. Waves 2019 (Vienna, Austria), *Fundamental models in nonlinear acoustics.* Talk within invited minisymposium on Nonlinear acoustics: analytical and numerical aspects, organised together with Barbara Kaltenbacher.
71. 1st Alps-Adriatic Inverse Problems (AAIP) Workshop 2019 (Klagenfurt, Austria), *Theoretical and numerical analysis of fundamental models in nonlinear acoustics.*
72. DMV-ÖMG 2021 (Passau, Germany), *On the reliable and efficient numerical integration of Kuramoto systems on graphs.*
73. Frontiers in numerical analysis of kinetic equations 2022 (Cambridge, United Kingdom), *On the numerical integration of the Landau equation.*

74. Second Austrian Calculus of Variations Day 2022 (Salzburg, Austria), *On the numerical evaluation of the Landau operator.*
75. Women in nonlinear dispersive PDEs 2023 (Banff, Canada), *Novel approaches for the reliable and efficient numerical evaluation of the Landau operator.*
76. ÖMG 2023 (Graz, Austria), *Novel approaches for the reliable and efficient numerical integration of the Landau equation.*

Conferences and courses (without presentation)

1. Summer School on Numerical Methods for ODEs 2000 (Dobbiaco, Italy)
2. 2nd EuroConference Mathematical Foundations of Geomechanics 2001 (Innsbruck)
3. Summer School in Geometric Integration 2002 (Fevik, Norway)
4. Summer School on Numerical Methods for Evolution Equations 2004 (Dobbiaco, Italy)
5. Summer School on Life Sciences 2005 (Dobbiaco, Italy)
6. SIMNET Kompaktkurs Lineare Gleichungssysteme und Hierarchische Matrizen 2006 (Graz, Austria)
7. Summer School on Delay Differential Equations and Applications 2006 (Dobbiaco, Italy)
8. Summer School on Molecular Dynamics and Time Integration of PDEs 2008 (Dobbiaco, Italy)
9. Dolomites Research Week on Approximation (DRWA) 2008 (Alba di Canazei, Trento, Italy)
10. Summer School on Discontinuous Galerkin Methods: Theory and Applications 2010 (Dobbiaco, Italy)
11. Spring School on Analytical and Numerical Aspects of Evolution Equations 2011 (Essen, Germany)
12. Advances in the Numerical Solution of Constrained Differential Equations (AMP) 2011 (Vancouver, Canada)
13. Spring School on Analytical and Numerical Aspects of Evolution Equations 2012 (Bielefeld, Germany)
14. Spring School on Analytical and Numerical Aspects of Evolution Equations 2013 (Berlin, Germany)
15. Austrian Numerical Analysis Day 2013 (Graz, Austria)
16. Recent Trends in Differential Equations: Analysis and Discretisation Methods 2013 (Berlin, Germany)
17. Stochastic Partial Differential Equations and Applications IX 2014 (Levico, Italy)
18. Austrian Numerical Analysis Day 2014 (Vienna, Austria)
19. 12th European Finite Element Fair 2014 (Vienna, Austria)
20. Advances in Nonlinear PDEs: Analysis, Numerics, Stochastics, Applications 2014 (Vienna, Austria)
21. International Conference on Computational Methods in Applied Mathematics 2014 (Strobl, Austria)
22. Austrian Numerical Analysis Day 2015 (Linz, Austria)
23. Stochastic Partial Differential Equations and Applications X 2016 (Levico, Italy)
24. Austrian Numerical Analysis Day 2018 (Klagenfurt, Austria)
25. Stochastic Partial Differential Equations and Applications 2018 (CIRM, Marseille, France)
26. Conference on Quantum Machine Learning Plus 2018 (Innsbruck, Austria)
27. Micromagnetics: Analysis, Numerics, Applications (MANA) 2018 (Vienna, Austria)
28. New Directions in Stochastic Analysis: Rough Paths, SPDEs and Related Topics 2019 (Berlin, Germany)

29. First Austrian Calculus of Variations Day 2019 (Vienna, Austria). Named as *contact person*.
30. Third Austrian Calculus of Variations Day 2023 (Vienna, Austria). Named as *contact person*.

8 Research stays and colloquia

Research stays

May 1998	Two weeks with César Palencia, Universitad de Valladolid. Supported by Acciones Integradas.
October 1999	Two weeks with César Palencia, Universidad de Valladolid. Supported by Acciones Integradas.
February 2000	Two weeks with Alexander Ostermann, Université de Genève. Supported by Schweizer Nationalfonds.
September 2002	One week with Gabriela Schranz–Kirlinger, Technische Universität Wien.
December 2002	One week with César Palencia, Universidad de Valladolid. Supported by Acciones Integradas.
April 2003	One week with Gabriela Schranz–Kirlinger, Technische Universität Wien.
July 2003	Three days with M. Hochbruck, Universität Düsseldorf.
November 2003	One week with César Palencia, Universidad de Valladolid. Supported by Acciones Integradas.
June 2004	One week with César Palencia, Universidad de Valladolid.
April 2005	One week with César Palencia and Cesáreo González, Universidad de Valladolid.
March 2006	One week with Volker Grimm, Universität Düsseldorf.
November 2006	One week with Cesáreo González, Universidad de Valladolid.
January 2007	Three days with Etienne Emmrich, Technische Universität Berlin.
May 2008	One week with Marco Caliari, Università di Verona.
July 2008	One week with Etienne Emmrich, Technische Universität Berlin.
December 2008	One week with Etienne Emmrich, Technische Universität Berlin.
April 2009	Three days with Etienne Emmrich, Technische Universität Berlin.
July 2009	One week with Etienne Emmrich, Technische Universität Berlin.
January 2010	Three days with Othmar Koch, Technische Universität Wien.
February 2010	One week with Etienne Emmrich, Universität Bielefeld.
August 2010	One week with Etienne Emmrich, Universität Bielefeld.
October 2010	One week with Stéphane Descombes, Université de Nice.
January 2011	Four days with Winfried Auzinger and Othmar Koch, Technische Universität Wien.
February 2011	One week with Etienne Emmrich, Universität Bielefeld.
May 2011	Four days with Lorenzo Pareschi, Università di Ferrara.
December 2012	Four days with Winfried Auzinger and Othmar Koch, Technische Universität Wien.
May 2012	One week with Winfried Auzinger and Othmar Koch, Technische Universität Wien.
October 2012	One week with Philippe Chartier and Florian Méhats, INRIA Rennes.
December 2012	One week with Etienne Emmrich, Technische Universität Berlin.
February 2013	Three days with Barbara Kaltenbacher, Universität Klagenfurt.
March 2013	Four days with Etienne Emmrich, Technische Universität Berlin.
March 2013	Three days with Lorenzo Pareschi, Università di Ferrara.
November 2013	Two days with Winfried Auzinger and Othmar Koch, Technische Universität Wien.
May 2014	Four days with Winfried Auzinger and Othmar Koch, Technische Universität Wien.

November 2014	Four days with Winfried Auzinger and Othmar Koch, Technische Universität Wien.
February 2015	Eight days with Etienne Emmrich, Technische Universität Berlin.
June 2015	Twelve days with Cesáreo González, Universidad de Valladolid.
January 2016	Three days with Barbara Kaltenbacher, Universität Klagenfurt.
March 2016	Four days with Winfried Auzinger and Othmar Koch, Technische Universität Wien, Universität Wien.
August 2016	Three days with Erika Hausenblas, Montanuniversität Leoben.
September 2016	Four days with Winfried Auzinger and Othmar Koch, Technische Universität Wien, Universität Wien.
February 2017	Three days with Barbara Kaltenbacher, Universität Klagenfurt.
August 2017	Two days with Barbara Kaltenbacher, Universität Klagenfurt.
January 2018	Three days with Winfried Auzinger and Othmar Koch, Technische Universität Wien, Universität Wien.
November 2018	Three days with Winfried Auzinger and Othmar Koch, Technische Universität Wien, Universität Wien.
December 2018	Three days with Winfried Auzinger and Othmar Koch, Technische Universität Wien, Universität Wien.
June 2019	Five days with Sergio Blanes, Universitat Politècnica de València, and Fernando Casas, Universitat Jaume I, IMAC and Departament de Matemàtiques, Castellón.
October 2019	Two days with Etienne Emmrich, Technische Universität Berlin.

Colloquia

1. Universidad de Valladolid (October 1999), *Time discretization of nonlinear parabolic problems.*
2. Université de Genève (February 2000), *On the convergence of Rosenbrock and W-methods for semilinear parabolic problems.*
3. Universität Wien (September 2002), *Zur zeitlichen Diskretisierung nichtlinearer Evolutionsgleichungen.*
4. Universidad de Valladolid (December 2002), *Stability results for variable stepsize linear multistep methods and applications to nonlinear evolution equations.*
5. Universität Wien (April 2003), *Stabilitätsresultate für Mehrschrittverfahren mit Anwendungen auf nichtlineare Evolutionsgleichungen.*
6. Universität Düsseldorf (July 2003), *Zum Langzeitverhalten von Zeitdiskretisierungen für nichtlineare parabolische Gleichungen.*
7. Universidad de Valladolid (November 2003), *On the convergence and stability behaviour of variable stepsize linear multistep methods for singular perturbation problems.*
8. Universidad de Valladolid (June 2004), *Magnus integrators for non-autonomous equations.*
9. Universidad de Valladolid (April 2005), *A second-order Magnus type integrator for non-autonomous semilinear parabolic problems.*
10. Universität Düsseldorf (March 2006), *Explicit exponential integrators unifying Runge-Kutta and multistep methods.*
11. Universidad de Valladolid (November 2006), *Exponential operator splitting for evolutionary Schrödinger equations.*
12. Technische Universität Berlin (January 2007), *On the convergence of exponential operator splitting for time-dependent Schrödinger equations.*
13. University of Cambridge (February 2007), *Exponential operator splitting for time-dependent Schrödinger equations.*
14. Technische Universität Berlin (July 2008), *High-order time-splitting spectral methods for nonlinear Schrödinger equations.*
15. Technische Universität Wien (January 2010), *Advanced space and time discretisations of nonlinear Schrödinger equations. Theoretical and practical aspects.*
16. Universität Bielefeld (February 2010), *Advanced space and time discretisations of nonlinear Schrödinger equations. Theoretical and practical aspects.*
17. Universität Bielefeld (August 2010), *Exponential operator splitting methods for linear evolutionary problems involving critical parameters.*
18. Université de Nice (October 2010), *Are exponential operator splitting methods favourable for the time integration of evolutionary Schrödinger equations?*
19. Norges teknisk-naturvitenskapelige universitet (NTNU) i Trondheim (November 2011), *Adaptive space and time discretisations for nonlinear Schrödinger equations.*
20. Universität der Bundeswehr München (November 2011), *Time integration methods for nonlinear evolution equations.*
21. Technische Universität Berlin (December 2012), *Stiffly accurate Runge–Kutta methods for nonlinear evolutionary equations and inequalities.*
22. Universität Klagenfurt (February 2013), *Adaptive integration methods for time-dependent Gross–Pitaevskii equations: Theoretical and practical aspects.*
23. Humboldt-Universität zu Berlin (February 2015), *Operator splitting methods for nonlinear Schrödinger equations.*
24. Universität Klagenfurt (January 2016), *Efficient time integration methods for highly oscillatory Schrödinger equations.*

25. Universität Wien (March 2016), *Convergence analysis of high-order commutator-free exponential integrators for non-autonomous linear evolution equations.*
26. Montanuniversität Leoben (August 2016), *Favourable time integration methods for non-autonomous linear evolution equations.*
27. Karlsruher Institut für Technologie (February 2017), *Time integration methods for non-autonomous evolution equations.*
28. Thematic Semester on Quantum Mathematics: The Mathematics inspired by Quantum Mechanics, Universitat Jaume I de Castelló, IMAC (June 2019), *Recent results on Magnus-type integrators and applications to quantum systems.*

Colloquia (Berufungsvortrag, Vorstellungsvortrag)

1. Universität Klagenfurt (April 2011), Berufungsvortrag Angewandte Analysis, *Favourable space and time discretisations for nonlinear Schrödinger equations.*
2. Fakultät für Luft- und Raumfahrttechnik der Unversität der Bundeswehr München (Juni 2011), Vorstellungsvortrag Vertretungsprofessur *Numerische Methoden in der Luft- und Raumfahrttechnik* (W3), *Numerical methods for nonlinear evolution equations.*
3. Fakultät für Mathematik der Universität Bielefeld (Oktober 2012), Berufungsvortrag Mathematik (W2), *High-order time-splitting pseudo-spectral methods for nonlinear Schrödinger equations.*
4. Antrittsvorlesung Leopold–Franzens Universität Innsbruck (December 2016), *Commutator-free Magnus integrators combined with operator splitting methods and their areas of application.*

Colloquia and short presentations (Universität Innsbruck)

1. Mat*iné*, Institut für Mathematik (April 2005), *Exponentielle Integratoren für parabolische Evolutionsgleichungen.*
2. Tag der offenen Tür (November 2005), *Studieren an der Fakultät für Mathematik, Informatik und Physik – Technische Mathematik.*
3. Institut für Astrophysik (December 2005), *Exponentielle Verfahren für Evolutionsgleichungen.*
4. Tag der Mathematik (February 2006), *Das Mathematikstudium an der Universität Innsbruck.*
5. Tag der offenen Tür (November 2007), *Mathematik in Innsbruck – Studium und Berufsaussichten.*
6. Tag der Mathematik (February 2008), *Mathematik in Innsbruck – Studium und Berufsaussichten.*
7. FIT – Frauen in die Technik (February 2009), *Mathematik in Innsbruck – Studium und Berufsaussichten.*
8. Tag der offenen Tür (November 2009), Gerhard Kirchner, Mechthild Thalhammer. *Mathematik in Innsbruck – Studium und Berufsaussichten.*
9. Seminar High Performance Computing 2009/10 (January 2010), *Advanced discretisations of nonlinear Schrödinger equations. From Scientific to High Performance Computing.*
10. FIT – Frauen in die Technik (February 2010), *Mathematik in Innsbruck – Studium und Berufsaussichten.*

11. FIT – Frauen in die Technik (February 2011), *Mathematik in Innsbruck – Studium und Berufsaussichten.*
12. Tag der Mathematik (February 2011), *Mathematik in Innsbruck – Studium und Berufsaussichten.*
13. Girls' Day (April 2011), *Mathematik in Innsbruck – Studium und Berufsaussichten.*
14. Girls' Day (April 2013), *Mathematik in Innsbruck – Studium und Berufsaussichten.*
15. Girls' Day (April 2018), *Mathematik in Innsbruck – Studium und Berufsaussichten.*
16. Girls' Day (April 2019), *Mathematik in Innsbruck – Berufsbild und Berufsaussichten.*

9 Refereeing activities and committees

Editorial board

Member of the editorial board of BIT Numerical Mathematics (since January 2011)
Lead guest editor of *Special Issue on Advanced Numerical Methods for linear and nonlinear Schrödinger-type equations* in Journal Advances in Numerical Analysis
Guest editor of *Special Issue on Numerical Methods for Evolutionary Problems* in MPDI together with B. Cano.

Review for research project

Agence nationale de la recherche ANR (2017)

Regular reviews for scientific journals

Applied Mathematical Modelling (AMM)
Applied Mathematics and Computation (AMC)
Applied Numerical Mathematics – Transactions of IMACS
Applied Numerical Mathematics (APNUM)
BIT Numerical Mathematics
Foundations of Computational Mathematics manuscript (FOCM)
International Journal for Numerical Methods in Fluids
International Journal of Computer Mathematics (IJCM)
IMA Journal of Numerical Analysis (IMAJNA)
Journal of Computational and Applied Mathematics (CAM)
Journal of Computational Methods in Applied Mathematics (CMAM)
Journal of Computational Physics (JCOMP)
Journal of Computer Physics Communications (CPC)
Journal of Numerical Analysis, Industrial and Applied Mathematics (JNAIAM)
Journal of Mathematical Analysis and Applications (JMAA)
Mathematical Modelling and Numerical Analysis (M2AN)
Mathematics and Computers in Simulation (MATCOM)
Mathematics of Computation (MCOM)
Numerical Algorithms (NUMA)
Numerische Mathematik
Physica D: Nonlinear Phenomena
SIAM Journal on Numerical Analysis (SINUM)
SIAM Journal on Scientific Computing (SISC)

Member of committees and reports

Defence of Bawfeh Kingsley Kometa (Trondheim, Norway, November 8, 2011)
Defence of Amir Saboor Bagherzadeh (Vienna, Austria, November 28, 2011)
Defence of Martin Tutz (Vienna, Austria, May 3, 2013)
Defence of Georg Kitzhofer (Vienna, Austria, November 15, 2013)
Xiaowei Jia (Singapore, Report on PhD thesis, 2015)
Defence of Guillaume Leboucher (Rennes, France, December 8, 2015)
Mattia Lupetti (Vienna, Report on PhD thesis, 2015)
Lukas Neumann (Innsbruck, Report on habilitation thesis, 2018)
Defence of Monika Eisenmann (Berlin, Germany, October 15, 2019)
Jia Yin (Singapore, Report on PhD thesis, 2019)
Defence of Kistosil Fahim (Leoben, Austria, February 8, 2021)
Defence of Tobias Jawecki (Vienna, Austria, December 13, 2022)

Member of committees (Universität Innsbruck)

Berufungskommission Professur *Wahrscheinlichkeitstheorie und Statistik* (2007)
Habilitationskommission Richard Kowar (2011)
Berufungskommission Professur *Funktionalanalysis und deren Anwendungen* (2011/2012)
Berufungskommission Professur *Mathematik* (2011/2012)
Habilitationskommission Ralf Kissmann (2014)
Berufungskommission Professur *Angewandte Algebra und diskrete Mathematik* (2014/2015)
Beirat für Qualifizierungsvereinbarungen der MIP-Fakultät (2014/2015)
Berufungskommission Professur *Stochastik* (Vorsitzende, 2015/2016)
Habilitationskommission Herman Mena (2016)
Habilitationskommission Christian Bargetz (2017/2018)
Berufungskommission Theoretische Quantenphysik (2017/2018)
Berufungskommission Ingenieurmathematik (2017/2018)
Berufungskommission Astrophysik mit Schwerpunkt Extragalaktik (2019/2020)
Berufungskommission Optimierung (Vorsitzende 2019/2020)
Berufungskommission Mathematik mit dem Schwerpunkt Variationsmethoden und partielle Differentialgleichungen (2019/2020)
Senat (Ersatzmitglied, Amtsperiode ab 1.10.2016)
Betriebsrat (Mitglied, Amtsperiode ab 31.5.2021)

10 Awards and public outreach

Awards

1. *Würdigungspreis des Bundesministers für Wissenschaft, Verkehr und Kunst für Absolventen von Diplomstudien für das Jahr 1997*
2. *SIAM 100-Dollar, 100-Digit Challenge (2002): First Prize 100-digit Winner* together with Gerhard Kirchner, Alexander Ostermann, and Peter Wagner
3. *Preis der Landeshauptstadt Innsbruck für die wissenschaftliche Forschung an der Universität Innsbruck 2007*
4. *Frankreich–Preis der Universität Innsbruck 2008* (Kategorie Post-Doc)
5. *Forschungspreis der Stiftung Südtiroler Sparkasse 2020*

Committee

Vojtěch Jarník International Mathematical Competition 2010, University of Ostrava. Jury member.

Recent interviews

Die Erste sein, Interview by Marianna Kastlunger, 6020 Stadtmagazin, Ausgabe März 2019.
archiv.6020online.at/ausgaben/maerz-2019/die-erste-sein/
Taschenrechner in der Schule: "Es bleibt mehr Zeit zum Denken", Interview by Lisa Kogelnik, Der Standard, 11.2.2021.
www.derstandard.at/story/2000114342294/taschenrechner-in-der-schule-es-bleibt-mehr-zeit-zum-denken