

# Curriculum Vitae

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## Jan Nordström

date of birth: November 16, 1953

Married, 4 children

### Degrees

- 1980 Master of Science in Aeronautics, The Royal Institute of Technology (KTH) Stockholm, Sweden
- 1993 PhD in Numerical Analysis, The Department of Scientific Computing Uppsala University (UU), Uppsala, Sweden
- 1999 Docent (Habilitation) in Numerical Analysis, UU

### Current positions

- 2010 - Professor in Scientific Computing, Department of Mathematics, Linköping University (LiU), Sweden
- 2012 - Head of Division in Computational Mathematics, LiU, Sweden

### Current honorary affiliations

- 2009 - Senior Research Fellow, Center for Turbulence Research (CTR), Stanford University (SU), USA
- 2010 - Honorary Professor, School of Computational and Applied Mathematics, University of the Witwatersrand (WITS), South Africa

### Board work

- 2012 - Member of the board of Linköping Institute of Technology (LiTH)
- 2012 - Member of Advisory group for research/graduate education LiTH
- 2013 - Editorial board (associate editor) of BIT Numerical Mathematics
- 2014 - Member of the board of the National Supercomputer Centre (NSC)
- 2016 - Editorial board (associate editor) of Journal of Computational Physics

### **Previous positions and affiliations**

1980 - 1995	Research Scientist, The Aeronautical Research Institute of Sweden (FFA)
1986 - 1991	Acting head at the Viscous Flow Branch, FFA
1995 - 2001	Senior Scientist, FFA
1995 - 1999	Research leader for the Unsteady Aerodynamics group at FFA
1999 - 2001	Research leader for the Wave Propagation group at FFA
1999 - 2001	Research leader for the Numerical Methods group at FFA
2001 - 2002	Senior Scientist, The Swedish Defense Research Agency (FOI)
2001 - 2004	Adjunct Professor, Numerical Analysis (Adjungerad), UU
2002 - 2010	Director of Research (Forskningschef) in Numerical Analysis, FOI
2006 - 2009	Adjunct Professor, Numerical Analysis, UU
2007 - 2009	Visiting Professor, 6 months, Department of Mechanical Engineering, Stanford University (SU), USA
2009 - 2010	Adjunct Professor, Scientific Computing, UU
2009 - 2010	Professor in Aeronautical Engineering, School of Mechanical, Industrial and Aeronautical Engineering, University of the Witwatersrand (WITS), South Africa
2009 - 2010	Head of Division of Aeronautical Engineering, School of Mechanical, Industrial and Aeronautical Engineering, WITS, South Africa
2010 - 2013	Visiting Professor, School of Electrical and Information Technology, WITS, South Africa
2011 - 2011	Visiting Professor, 3 months, Department of Mechanical Engineering, Stanford University, USA

### **Research visits and Consultant positions**

1987	Visiting Scientist, 3 months, NASA Ames, USA
1996 - 1997	Visiting Scientist, 2 months, ICASE, USA
1998 - 2002	7 months as ICASE (Institute of Computer Applications in Science and Engineering) Consultant
2003 - 2005	Visiting Scientist, 3 months, National Institute of Aerospace (NIA), USA
2003 - 2005	Consultant, 3 months, Appl. Math., Brown University, USA
2005 - 2007	Senior Visiting Fellow, 3 months, Center for Turbulence Research, SU, USA
2006 - 2008	Consultant 2 months/year for the Dept. of Vehicle

and Aeronautical Engineering, KTH  
2010 Visiting Scientist, 1 month, NIA, USA  
2011 Visiting Scientist, 1 week, Caltech, USA  
2013 Visiting Scientist, 1 week, Caltech, USA  
2014 Senior Visiting Fellow, 1 week, CTR, Stanford University, USA  
2014 Visiting Scientist, 1 week, University of Zurich, Switzerland  
2015 Visiting Scientist, 1 week, Florida State University, USA  
2015 Visiting Scientist, 1 month, NIA, USA  
2015 Senior Visiting Fellow, 1 week, CTR, Stanford University, USA  
2015 Visiting Scientist, 1 week, University of Zurich, Switzerland  
2016 Visiting Scholar, 1 month, Department of Mechanical Engineering, Stanford University, USA  
2017 Visiting Scholar, 1 month, Department of Mechanical Engineering, Stanford University, USA  
2017 Visiting Academic, 2 weeks, Department of Mechanical Engineering, University of Cape Town, South Africa

### **Evaluation and committee work**

2004 Independent Expert, EU 6th framework program, EST  
2004 Independent Expert, EU 6th framework program, OIF  
2004 Independent Expert, EU 6th framework program, IIF  
2004 Member PhD Thesis evaluation committee  
2004 Scientific reviewer for the Swedish Research Council  
2005 Member PhD Thesis evaluation committee  
2006 Independent Expert, EU 6th framework program, TOK  
2007 - 2009 Scientific reviewer for the Georgian Research Council  
2008 Member International Scientific Committee for Africomp2009  
2009 Expert opinion for a successful promotion at Stanford University  
2009 Expert opinion for a successful application for the PECASE (Presidential Early Career Award for Scientists and Engineers) award  
2010 Member International Scientific Committee for Africomp2011  
2011 Scientific evaluator for the Cyprus Research Promotion Foundation  
2011 Member PhD Thesis evaluation committee  
2011 Scientific reviewer for National Science Foundation, Georgia  
2011 Expert opinion for a successful application to a faculty position at the U.S. Naval Post Graduate School in Monterey  
2012 Member of two Docent evaluation committees  
2012 Member International Scientific Committee for Africomp2013

2012 Member PhD Thesis evaluation committee  
 2013 Chairman, Numerical Treatment of Boundary Conditions, 21st  
 AIAA CFD conference, San Diego, USA.  
 2013 Member PhD Thesis evaluation committee  
 2014 Member Evaluation Panel, Mathematical Sciences, Swedish Research  
 Council  
 2014 Chairman for the Applied Mathematics panel, Academy of Finland  
 2014 Reviewer for the Mathematics panel, Swiss National Science  
 Foundation  
 2014 Member PhD Thesis evaluation committee  
 2014 Member of three Docent evaluation committees  
 2014 Member International Scientific Committee for Africomp2015  
 2014 Member Organizing Committee for 3rd International Workshop  
 on High-Order CFD Methods  
 2014 Expert opinion for a succesful promotion at Stanford University  
 2015 Member PhD Thesis evaluation committee  
 2015 Member of two Docent evaluation committees  
 2015 Member Organizing Committee for 4th International Workshop  
 on High-Order CFD Methods  
 2016 Member PhD Thesis evaluation committee  
 2016 Member of Docent evaluation committee  
 2016 Member Scientific Committee for 6th EASN International  
 Conference on Innovation in European Aeronautics Research  
 2017 Member Organizing Committee for 5th International Workshop  
 on High-Order CFD Methods  
 2017 Member PhD Thesis evaluation committee  
 2017 Member Scientific Committee for 7th EASN International  
 Conference on Innovation in European Aeronautics Research  
 2017 Expert opinion for a succesful promotion at Rensselaer  
 Polytechnic Institute

### Recent talks

2016 An Investigation of Uncertainty Effects in Mixed Hyperbolic-  
 Parabolic Problems due to Stochastically Varying Geometry,  
 SIAM UQ 2016, Lausanne, Switzerland.  
 2016 Improved Dual TimeStepping Using Second Derivatives  
 ECCOMAS 2016, Crete, Greece.  
 2016 New Developments for Initial Boundary Value Problems

- involving Multi-physics at Linköping University, NASA Ames, Research Center, Mountain View, USA
- 2016 New Developments for Initial Boundary Value Problems involving Multi-physics at Linköping University, Stanford University, Stanford, USA
- 2016 A Roadmap to Well Posed and Stable Problems in Computational Physics, Stanford University, Stanford, USA
- 2016 New Developments for Initial Boundary Value Problems involving Multi-physics at Linköping University, 6th EASN International Conference, Porto, Portugal
- 2017 Improved Numerical Performance Using the SBP-SAT Technique As the Main Building Block, SIAM CSE 17, Atlanta, USA
- 2017 Summation-By-Parts (SBP) schemes and weak boundary conditions using Simultaneous Approximation Terms (SAT): theory and applications, KTH, Sweden
- 2017 Stochastic Galerkin Projection and Numerical Integration for Stochastic Systems of Equations, UNCECOMP 2017, Rhodos Greece
- 2017 Energy Stable Boundary Conditions for the Nonlinear Incompressible Navier-Stokes Equations, Naval Postgraduate School, Monterey, USA
- 2017 Energy Stable Boundary Conditions for the Nonlinear Incompressible Navier-Stokes Equations, Stanford University, Stanford, USA

### Invited talks

- 2007 American Mathematical Society, Mathematical and Computational aspects of Compressible Flow, Albuquerque, USA
- 2008 SIAM Annual meeting, Computational Methods for Compressible Flow, San Diego, USA
- 2010 SACAM10, Keynote talk, Weak Boundary and Interface Conditions with Multi-physics Applications, Pretoria, South Africa
- 2010 SIAM Annual Meeting, Nonlinear Boundary Conditions for Wave Propagation Problems, Pittsburgh, USA
- 2011 Africomp2011, Keynote talk, Initial Boundary Value Problems, Summation-by-parts Operators and Weak Boundary Conditions, Cape Town, South Africa

- 2011 The Popular Applied Mathematics seminar (PAM), Initial Boundary Value Problems, Summation-by-parts Operators and Weak Boundary Conditions, Uppsala, Sweden
- 2011 ICIAM 2011, Initial Boundary Value Problems, Summation-by-parts Operators and Weak Boundary Conditions, Vancouver, Canada
- 2012 Linear and Nonlinear Boundary and Interface Problems, Oberwolfach workshop, Germany
- 2012 Initial Boundary Value Problems and Boundary/Interface Conditions with Multi-Physics Applications, AIM workshop, Palo Alto, USA
- 2012 CTR Seminar: New Developments for Finite Difference Approximations of Initial Boundary Value Problems: Time Integration and Dual Consistency, Stanford, USA
- 2013 Stable High Order Finite Difference Methods for Wave Propagation Problems, SIAM CSE Meeting, Boston, USA
- 2013 SANUM 2013, Plenary talk, Initial Boundary Value Problems, Summation-by-parts Operators and Weak Boundary Conditions, Stellenbosch, South Africa
- 2013 Flamengro conference 2013, Initial Boundary Value Problems and Boundary/Interface Conditions with Multi-Physics Applications, Pretoria, South Africa
- 2014 SANUM 2014, Plenary talk, High Order Finite Difference Approximations of Multi-Physics Problems, Johannesburg, South Africa
- 2015 Well Posed Problems and Boundary Conditions in Computational Fluid Dynamics, Aviation 2015, Dallas Texas, USA.
- 2015 Well Posed Problems and Boundary Conditions in Computational Fluid Dynamics, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany.
- 2015 Plenary talk at 28th Nordic Seminar on Computational Mechanics: New Developments for Initial Boundary Value Problems involving Multi-physics at Linköping University, Tallin, Estonia.
- 2016 An Investigation of Uncertainty Effects in Mixed Hyperbolic-Parabolic Problems due to Stochastically Varying Geometry, SIAM UQ 2016, Lausanne, Switzerland.
- 2016 A Roadmap to Well Posed and Stable Problems in Computational Physics, Stanford University, Stanford, USA
- 2016 New Developments for Initial Boundary Value Problems involving Multi-physics at Linköping University, 6th EASN International Conference, Porto, Portugal
- 2017 Improved Numerical Performance Using the SBP-SAT

Technique As the Main Building Block, SIAM CSE 17,  
Atlanta, USA

### **Invited to the following workshops and programs**

- |      |   |
|------|---|
| 2012 | Mathematisches Forschungsinstitut Oberwolfach: Recent Developments in the Numerics of Nonlinear Hyperbolic Conservation Laws and their Use in Science and Engineering |
| 2012 | American Institute of Mathematic (AIM): Nonlinear solvers for high-intensity focused ultrasound with application to cancer treatment.                                 |
| 2015 | Mathematisches Forschungsinstitut Oberwolfach: Recent Developments in the Numerics of Nonlinear Hyperbolic Conservation Laws and their Use in Science and Engineering |
| 2016 | The Center for Turbulence Research, CTR summer program, Stanford University   |
| 2018 | Institut de Mathematiques de Toulouse:<br>NABUCO (NumericAl BoUndaries and COupling)  |

### **PhD Student supervision**

- |             |  |
|-------------|--|
| 1997 - 2003 | Ken Mattsson, Thesis title: Summation-by-Parts Operators for High Order Finite Difference Methods  |
| 1999 - 2004 | Magnus Svård, Thesis title: Stable High Order Finite Difference Methods for Aerodynamics   |
| 2003 - 2007 | Jing Gong, Thesis title: Hybrid Methods for Unsteady Fluid Flow Problems in Complex Geometries   |
| 2006 - 2011 | Qaiser Abbas, Thesis title: Weak Boundary and Interface Procedures for Wave and Flow Problems  |
| 2006 - 2016 | Sven-Erik Ekström, (Licenciate) Project: ADIGMA, A Vertex-Centered Dual Discontinuous Galerkin Method for Hyperbolic Problems, Martin Berggren UMU 1st advisor |
| 2007 - 2012 | Sofia Eriksson, Project: Stable Numerical Methods with Boundary and Interface Treatment for Applications in Aerodynamics                                       |
| 2007 - 2012 | Kenneth Duru, Thesis title: Perfectly Matched Layers and High Order Difference Methods for Wave Equations, Gunilla Kreiss UU 1st advisor                       |
| 2008 - 2013 | Jens Berg, Project: Stable and High-Order Finite Difference  |

- Methods for Multiphysics Flow Problems
- 2008 - 2013 Per Pettersson, Project: Uncertainty Quantification and Numerical Methods for Conservation Laws, jointly with Gianluca Iaccarino, SU
- 2011 - 2016 Tomas Lundquist, Project: High Order Summation-by-Parts Methods in Time and Space
- 2011 - 2016 Samira Nikkar, Project: Stable High Order Finite Difference Methods for Wave Propagation and Flow Problems on Deforming Domains
- 2011 - 2016 Ossian O'Reilly, Project: High Order Accurate Numerical Methods in Geophysics, jointly with Eric Dunham SU
- 2012 - 2017 Hannes Frenander, Project: High-order finite difference approximations for hyperbolic problems: multiple penalties and non-reflecting boundary conditions
- 2012 - 2017 Cristina La Cognata, Project: High order summation-by-parts based approximations for discontinuous and nonlinear problems
- 2012 - 2017 Viktor Linders, Project: Error analysis of summation-by-parts formulations: Dispersion, transmission and accuracy
- 2013 - Markus Wahlsten, Project: Robust Formulation of PDEs in Uncertainty Quantification (EU-FP7 UMRIDA)
- 2014 - Fatemeh Ghasemi, Project: Duality Based Boundary Conditions for the Navier-Stokes and Elastic Wave Equations
- 2014 - Andrea Ruggio, Project: Methods for Improved Accuracy in Unsteady CFD
- 2016 - Oskar Ålund, Project: High order finite difference methods on unstructured grids
- 2017 - Fredrik Lauren, Project: TBA

### **Postdoc supervision**

- 2011 - 2014 Marco Kupiainen, Project: InDustrIalisation of Higher Order Methods (IDIHOM)

### **Teaching experience**

- 2001 Graduate course in Computational Aeroacoustics (UU)
- 2004 Graduate course in Artificial Boundary Conditions (UU)
- 2007 Undergraduate course in Scientific Computing (UU)
- 2007 Undergraduate course in Analysis of Numerical Methods (UU)



- 2008 Undergraduate course in Computational Fluid Dynamics (KTH)
- 2008 Graduate course in Initial Boundary Value Problems (UU)
- 2009 Graduate course in Numerical Methods for Initial Boundary Value Problems, Institute of Computational Mathematics in Engineering (iCME), Stanford University
- 2011 Graduate course in Numerical Methods for Initial Boundary Value Problems, Institute of Computational Mathematics in Engineering (iCME), Stanford University
- 2011 Graduate course in Numerical Methods for Initial Boundary Value Problems, Linköping University (LiU)
- 2013 Short course in Numerical Solution of Initial Boundary Value Problems, Council for Scientific and Industrial Research (CSIR), Pretoria, South Africa
- 2013 SeSE Graduate course in Numerical Solution of Initial Boundary Value Problems, (LiU)
- 2014 Graduate course, Selected articles on well posed problems and numerical approximations, (LiU)
- 2016 SeSE Graduate course in Stochastic Galerkin Methods for Partial Differential Equations, (LiU)
- 2017 SeSE Graduate course in Numerical Solution of Initial Boundary Value Problems, (LiU)
- 2017 SeSE Graduate course in Numerical Solution of Initial Boundary Value Problems, University of Cape Town

### **Review and editorial work**

- 1993 - Journal of Computational Physics
- 1995 - Applied Numerical Mathematics
- 1999 - Journal of Scientific Computing
- 1999 - SIAM, Journal of Numerical Analysis
- 1999 - SIAM, Journal of Scientific Computing
- 2008 - 2011 Editorial board of International Journal of Mechanics and MEMS
- 2009 - AIAA Journal
- 2010 - Journal of Mathematical Modeling and Numerical Analysis
- 2010 - Communications in Computational Physics (CiCP)
- 2010 - Computer Methods in Applied Mechanics and Engineering
- 2011 - Journal of Aerospace Engineering
- 2011 - BIT Numerical Mathematics
- 2012 - Applied Mathematics and Computation

- 2012 - Journal of Fluid Mechanics
- 2012 - International Journal of Numerical Methods for Heat and Fluid Flow
- 2012 - International Journal of Computational Fluid Dynamics
- 2013 - Physics of Fluids
- 2013 - International Journal of Nonlinear Sciences and Numerical Simulation
- 2013 - Editorial board of BIT Numerical Mathematics
- 2014 - Ocean Modelling
- 2015 - Bulletin of the Iranian Mathematical Society
- 2016 - Editorial board of Journal of Computational Physics (JCP)

### **Recent projects**

- 1996 - 2010 High order finite difference approximations, collaboration with ICASE, NIA and NASA, USA
- 1998 - 2010 Accelerating coordinate systems, collaboration with CSIR, South Africa
- 2004 - 2010 Unsteady Supersonic Aerodynamics, collaboration with WITS, South Africa
- 2005 - 2009 Hybrid Methods for Unsteady Aerodynamics, collaboration with CTR, the Centre for Turbulence Research, SU, USA
- 2007 - 2013 Uncertainties in Aerodynamics, collaboration with the Department of Mechanical Engineering, SU, USA
- 2008 - 2012 Computational methods for heat transfer in micro-mechanical systems, collaboration with Nanospace AB, Swedish Space Corporation Group, Sweden
- 2009 - 2011 Nonlinear generation of internal waves in the deep ocean by tides, collaboration with MISU, Stockholm University
- 2009 - 2016 Computational Methods for Earthquake Simulations, collaboration with the Department of Geophysics, SU, USA
- 2010 - 2013 The European Union, FP7: IDIHOM Industrialisation of High-Order Methods, 181564 euro in 3 years
- 2012 - 2017 The SeRC FLOW Community. Stable High-Order Boundary Conditions for In- and Outgoing Waves for Fluid Flow Problems
- 2012 - Swedish Meteorological and Hydrological Institute (SMHI). Numerical methods for Climate Problems
- 2012 - 2015 The Swedish Research Council: Summation-By-Parts Operators and Weak Initial Conditions for Time Discretisation of Initial Boundary Value Problems

- 2013 - 2016 The European Union, FP7: UMRIDA Uncertainty Management for Robust Industrial Design in Aeronautics
- 2013 - 2017 VINNOVA-NFFP project: Methods for Improved Accuracy in Unsteady CFD (MIAU)
- 2014 - The research school in interdisciplinary mathematics at MAI, Linköping University, Duality Based Boundary Conditions for the Navier-Stokes and Elastic Wave Equations

### Grants

- 1995 VINNOVA-NFFP project: Unsteady aerodynamics of compressible flow, collaboration between FFA and SAAB, 1500.000 SEK in two years
- 1999 FFA internal funds: Stable High Order Finite Difference Methods for Aerodynamics, collaboration with UU, 1000.000 SEK in two years
- 2004 The Swedish Research Council: Unsteady aerodynamics of compressible flow, collaboration with WITS South Africa, planning grant, 75.000 SEK
- 2005 The Swedish Research Council: Generation and propagation of vortices in aerodynamic applications, collaboration with WITS South Africa, 450.000 SEK in 3 years
- 2007 The Swedish Governmental Agency for Innovation Systems: Numerical methods for micromechanical systems in space, collaboration with Nanospace AB, 1600.000 SEK in 4 years
- 2009 The Swedish Research Council: Nonlinear generation of internal waves in the deep ocean by tides, collaboration with MISU, Stockholm University, 1600.000 SEK in 3 years
- 2010 Professor Career Contract for research, 2200.000 SEK/year in 5 years issued by Linköping University
- 2010 Startup Grant, 8000.000 SEK in 5 years from Linköping University
- 2010 The European Union, FP7: IDIHOM Industrialisation of High-Order Methods, 181564 euro in 3 years
- 2012 The SeRC FLOW Community. Stable High-Order Boundary Conditions for In- and Outgoing Waves for Fluid Flow Problems, 2400.000 SEK in 4 years
- 2012 Swedish Meteorological and Hydrological Institute (SMHI). Numerical methods for Climate Problems, 1900.000 SEK in 4 years
- 2012 The Swedish Research Council: Summation-By-Parts Operators and Weak Initial Conditions for Time Discretisation of Initial Boundary Value Problems, 1800.000 SEK in 3 years
- 2013 The European Union, FP7: UMRIDA Uncertainty Management

2013	for Robust Industrial Design in Aeronautics, 200000 euro in 3 years VINNOVA-NFFP project: Methods for Improved Accuracy in Unsteady CFD (MIAU), 1800.000 SEK in 3 years
2014	The research school in interdisciplinary mathematics at MAI, Linköping University, Duality Based Boundary Conditions for the Navier-Stokes and Elastic Wave Equations, 1300.000 SEK in 5 years

### **Main advisor for the following PhD thesis**

1. K. Mattsson, Summation-by-Parts Operators for High Order Finite Difference Methods, Acta Univ. Ups. Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology 828. 23 pp. Uppsala ISBN 91-554-5596-4. 2003.
2. M. Svärd, Stable High Order Finite Difference Methods for Aerodynamics, Acta Univ. Ups. Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology 1026. 25 pp. Uppsala ISBN 91-554-6063-1. 2004.
3. J. Gong, Hybrid Methods for Unsteady Fluid Flow Problems in Complex Geometries, Acta Univ. Ups. Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology 374. 28 pp. Uppsala ISBN 978-91-554-7046-3, 2007.
4. Q. Abbas, Weak Boundary and Interface Procedures for Wave and Flow Problems, Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology, ISSN 1651-6214; 862, 2011.
5. S. Eriksson, Stable Numerical Methods with Boundary and Interface Treatment for Applications in Aerodynamics, Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology, ISSN 1651-6214; 985 2012.
6. J. Berg, Stable and High-Order Finite Difference Methods for Multiphysics Flow Problems, Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology, ISSN 1651-6214; 1004, 2013.

7. P. Pettersson, Uncertainty Quantification and Numerical Methods for Conservation Laws, Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology, ISSN 1651-6214; 1008, 2013.
8. T. Lundquist, High order summation-by-parts methods in time and space, Linköping Studies in Science and Technology. Dissertations, ISSN 0345-7524; 1740, 2016.
9. S. Nikkar, Stable High Order Finite Difference Methods for Wave Propagation and Flow Problems on Deforming Domains, Linköping Studies in Science and Technology. Dissertations, ISSN 0345-7524, 1774, 2016.
10. O. O'reilly, Numerical methods for wave propagation in solids containing faults and fluid-filled fractures, Linköping Studies in Science and Technology. Dissertations, ISSN 0345-7524, 1806, 2016.
11. H. Frenander, High-order finite difference approximations for hyperbolic problems: multiple penalties and non-reflecting boundary conditions, Linköping Studies in Science and Technology. Dissertations, ISSN 0345-7524, 1824, 2017.
12. C. La Cognata, High order summation-by-parts based approximations for discontinuous and nonlinear problems, Linköping Studies in Science and Technology. Dissertations, ISSN 0345-7524, 1880, 2017.
13. V. Linders, Error analysis of summation-by-parts formulations: Dispersion, transmission and accuracy, Linköping Studies in Science and Technology. Dissertations, ISSN 0345-7524, 1886, 2017.

**Main advisor for the following Masters thesis**

1. A. Bengtsson & E. Ziakouli, The Influence of Open Boundary Conditions and Difference Operators on the Time-integration of the Burgers Equation, FFA TN 1988-57, Stockholm 1988.
2. N. Nordin, The Fringe Region Technique Used in the Direct Numerical Simulation of the Incompressible Navier-Stokes Equations, FFA TN 1995-04, Stockholm 1995.

3. F. Jansson, Boundary Conditions for the Compressible Navier-Stokes Equations at a Subsonic Outflow Boundary, FFA TN 1995-05, Stockholm 1995.
4. N. Lindberg, (jointly with Gunilla Efraimsson, FFA) Numerical Investigation of Extrapolation Boundary Conditions for the Euler Equations, FFA TN 1998-03, Stockholm 1998.
5. I. Karlsson, Boundary Conditions in the  $\kappa-\omega$  and  $\kappa-\epsilon$  Turbulence Models, FFA TN 1998-49, Stockholm 1998.
6. E. Petrini, (jointly with Gunilla Efraimsson, FFA) A Numerical Study of the Introduction and Propagation of a 2-D Vortex, FFA TN 1998-66, Stockholm 1998.
7. Rickard Lindkvist, Boundary Conditions for the Euler Equations, FFA TN 1999-31, Stockholm 1999.
8. Martin Björck, Finite Volume Approximations and Strict Stability for Hyperbolic Problems, FFA TN 2000-35, Stockholm 2000.
9. Björn Bretz, (jointly with Karl Forsberg, FFA) High Order Finite Difference Approximations of Hyperbolic Problems, FFA TN 2000-09, Stockholm 2000.
10. J. Persson, Discrete Approximations of Electromagnetic Problems, Scientific Report FOI-R-0119-SE, Stockholm 2001.
11. R. Gustafsson, High Order Finite Difference Approximations of Electromagnetic Wave Propagation Close to Material Discontinuities, Scientific Report FOI-R-0120-SE, Stockholm 2001.
12. C. Adamsson, (jointly with Karl Forsberg, FFA), Finite Volume Methods, Unstructured Meshes and Strict Stability, Scientific Report FOI-R-0121-SE, Stockholm 2001.
13. O. Fogelklou, Investigation of Time and Frequency Domain Based Methods for Radar Cross Section Calculations, Scientific Report FOI-R-0149-SE, Stockholm 2001.
14. A. Carlsson, Conservative Difference Formulations, Energy Estimates and Artificial Dissipation, Scientific Report FOI-R-0509-SE, Stockholm 2002.

15. S. Eriksson, (jointly with Magnus Svärd, Stanford University), Simulation of Ground Effects on Wake Vortices at Runways, Report ISSN: 1401-5757, UPTEC F07062, May 2007.
16. J. Lundberg, (jointly with Magnus Svärd, Stanford University), A Computational Study of Wing-Vortex Interaction Using a High Order Accurate Finite Difference Method, Report ISSN: 1401-5757, UPTEC F07089, May 2007.
17. P. Pettersson, (jointly with Gianluca Iaccarino, Stanford University), Numerical Analysis of Burgers' Equation with Uncertain Boundary Conditions Using the Stochastic Galerkin Method, UPTEC STS08011, March 2008.
18. N. Forsberg, (jointly with Gunilla Efraimsson, KTH), Simulation of Acoustic Waves in a Turbofan Engine Air Intake, UPTEC F09028, March 2009.
19. B. Lönn, Energy decay in vortices, UPTEC F11031, ISSN 1401-5757, June 2011.
20. O. O'Reilly, (jointly with E. M. Dunham, Stanford University), Coupled Finite Difference and Finite Volume Methods for Earthquake Rupture Dynamics in Complex Geometries. UPTEC F11040, August 2011.
21. C-F. Arndt, Energy estimates and variance estimation for hyperbolic stochastic partial differentialequations, LiTH-MAT-EX-2011/18-SE, September 2011.
22. T. Lundquist, Stability of SBP schemes on overlapping domains, LiTH-MAT-EX-2011/17-SE, September 2011.
23. D. M. Changfoot, (Jointly with A. Malan, University of Cape Town) Towards a Hybrid CFD Platform for Investigating Aircraft Trailing Vortices, University of Cape Town, November 2017. (<https://open.uct.ac.za/handle/11427/26905?show=full>)

### **5 most cited publications**

(Google Scholar, Scopus, Web of Science)

1. M. H. Carpenter, J. Nordström & D. Gottlieb, A Stable and Conservative Interface Treatment of Arbitrary Spatial Accuracy,

- Journal of Computational Physics, Vol. 148 No. 2, pp. 341-365, 1999. Number of citations: (376, 271, 194)
2. K. Mattson & J. Nordström, Summation by parts operators for finite difference approximations of second derivatives, Journal of Computational Physics, Vol. 199, pp. 503-540, 2004. Number of citations: (270, 181, 139)
  3. M. Svärd, M. H. Carpenter & J. Nordström, A Stable High-Order Finite Difference Scheme for the Compressible Navier-Stokes Equations, far-field boundary conditions, Journal of Computational Physics, Volume 225, Issue 1, Pages 1020-1038, 2007. Number of citations: (167, 126, 79)
  4. M. Svärd & J. Nordström, On the Order of Accuracy for Difference Approximations of Initial-Boundary Value Problems, Journal of Computational Physics, Vol. 218, pp. 333-352, 2006. Number of citations: (166, 104, 91)
  5. J. Nordström & M. H. Carpenter, Boundary and Interface Conditions for High Order Finite Difference Methods Applied to the Euler and Navier Stokes Equations, Journal of Computational Physics, Vol. 152 No. 2, pp. 621-645, 1999. Number of citations: (163, 108, 65)

### **h index**

(Google Scholar: 31, Scopus: 26, Web of Science: 24)

### **Articles**

1. J. Nordström, The Influence of Open Boundary Conditions on the Convergence to Steady State of the Navier-Stokes Equation, Journal of Computational Physics Vol. 85, No. 1, pp. 210-244, 1989.
2. J. Nordström, Extrapolation Procedures for the Navier-Stokes Equations, AIAA-journal Vol. 30, No. 6, pp. 1654-1656, 1992.
3. J. Nordström, The Use of Characteristic Boundary Conditions for the Navier-Stokes Equations, Computers & Fluids, Vol. 24, No.5, pp. 609-623, 1995.



4. J. Nordström, Accurate Solutions of the Navier-Stokes Equations Despite Unknown Outflow Boundary Data, *Journal of Computational Physics* Vol. 120, pp. 184-205, 1995.
5. J. Nordström, On Extrapolation Procedures at Artificial Outflow Boundaries for the Time-Dependent Navier-Stokes Equations, *Applied Numerical Mathematics*, Vol. 23, pp. 457-468, 1997.
6. J. Nordström, N. Nordin & D. Henningson, The Fringe Region Technique and the Fourier-method Used in the Direct Numerical Simulation of Spatially Evolving Viscous Flows, *SIAM Journal of Scientific Computing*, Vol. 20, No. 4, pp.1365-1393, 1999.
7. J. Nordström, On Flux-extrapolation at Supersonic Outflow Boundaries, *Applied Numerical Mathematics*, Vol. 30, Issue 4, pp. 447-457, 1999.
8. M. H. Carpenter, J. Nordström & D. Gottlieb, A Stable and Conservative Interface Treatment of Arbitrary Spatial Accuracy, *Journal of Computational Physics*, Vol 148 No. 2, pp. 341-365, 1999.
9. J. Nordström & M. H. Carpenter, Boundary and Interface Conditions for High Order Finite Difference Methods Applied to the Euler and Navier Stokes Equations, *Journal of Computational Physics*, Vol 148 No. 2, pp. 621-645, 1999.
10. S. Tsynkov, S. Abarbanel, J. Nordström, V. Ryaben'kii & V. Vatsa, Global Artificial Boundary Conditions for Computation of External Flow Problems with Jets, *AIAA Journal*, vol. 38, no. 11, Nov. 2000, pp. 2014-2022.
11. G. Kreiss, G. Efrainsson & J. Nordström, Elimination of First Order Errors in Shock Calculations, *SIAM Journal of Numerical Analysis*, Vol. 38, No. 6, pp. 1986-1998, 2001.
12. J. Nordström & Martin Björck, Finite Volume Approximations and Strict Stability for Hyperbolic Problems, *Applied Numerical Mathematics*, Volume 38, Issue 3, pp. 237-255, 2001.

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