

Curriculum Vitae

Personal Information:

Work Address: Space Science Center and Department of Physics
University of New Hampshire
8 College Rd, Morse Hall 245E
Durham, NH 03824
E-Mail: kai.germaschewski@unh.edu

Professional Experience:

2008 – curr. **Assistant Professor**
Space Science Center and Department of Physics
University of New Hampshire,
Durham, NH 03824, USA

2007 – 2008 **Assistant Professor**
Center for Interdisciplinary Computing,
Dept of Computer Science,
College of Staten Island, City University of New York,
Staten Island, NY 10314, USA

2003 – 2007 **Research Scientist**
Space Science Center,
University of New Hampshire, Durham, NH 03824, USA

2002 – 2003 **Postdoctoral position**
Center for Magnetic Reconnection Studies,
University of Iowa, Iowa City, IA 52242, USA

2001 – 2002 **Postdoctoral position**
Institute for Theoretical Physics,
Ruhr–University, Bochum, Germany

1998 – 2000 **Teaching and research assistant,**
Institute for Theoretical Physics,
Heinrich–Heine–University, Düsseldorf, Germany

1997 – 1998 **Teaching assistant,**
Institute for Theoretical Physics,
Heinrich–Heine–University Düsseldorf, Germany

Education:

Feb. 2001	Ph.D. in Physics , magna cum laude, Heinrich-Heine-Universität, Düsseldorf, Germany Topic: <i>Pulse propagation in media with anisotropic dispersion</i>
Nov. 1998	Diploma with distinction in Theoretical Physics, Heinrich-Heine-Universität, Düsseldorf, Germany
Sep. 1996	Study abroad (for half a year) University of California, Davis, CA, USA
Oct. 1993	Beginning of studies at the Heinrich-Heine-Universität, Düsseldorf (Physics, Mathematics)
1992 – 1993	Military Service
Jun. 1992	Abitur (high school diploma)

Fellowships: Fellow of *Studienstiftung des deutschen Volkes*, Bonn

Referee for:

- Physica D
- Physics of Plasmas
- Astronomical Society of the Pacific
- Advances in Space Research

Reviewer for:

- DOE / SBIR
- DOE / Fusion Theory
- NSF / CISE

Research Experience:

- Kinetic description of plasmas (Vlasov)
- Fluid description of plasmas, impulsive magnetic reconnection
- Pulse propagation in anisotropic media
- Block-structured adaptive mesh refinement
- Implicit time integration of PDEs
- Direct solvers, code generation, optimization

Interests

- Two-fluid description of plasmas, reconnection
- Computational Fluid Dynamics
- Parallelization, Scalability
- Efficiently using modern computer architectures
- Employing Computer Science techniques and tools to make a scientist's life easier (code reusability, maintainability, ease of use, ...)

**Grant
Support:**

Current:

- DOE/EPSCoR CICART (Co-PI)
- DOE Reconnection Research at CMSO
- NSF/PetaApps: Petascale Geospace Simulations (Co-PI)
- NASA/LWS: Multi-Scale Model of Earth's Magnetosphere (Co-PI)

Pending:

- NSF/CRI: Acquisition of a Cell BE based Cluster for Development and Deployment of Advanced Computational Methods (PI)
- DOE/ASCR: Automatic code generation for discretizations on structured grids (PI)
- NSF/HECURA: Infrastructure Tools to Exploit RDMA coupling between High-End Computing Applications (Co-PI)
- DOE/CICART supplement (Co-PI)

Declined:

- DOE plasma physics junior faculty development program (program was cancelled after Lol) (PI)

Courses taught:

- CSC 228: Discrete Mathematics (College of Staten Island, Fall 07, Spring 08)
- CSC 522: Introduction to Python (College of Staten Island, Spring 08)
- PHYS/MATH 931: Mathematical Methods in Physics (UNH, Fall 08)
- PHYS 408 R: Recitations, General Physics II (UNH, Spring 08)

Curriculum development:

- IAM8xx: High Performance Computing (developed outline, syllabus)
- member of graduate curriculum subcommittee to improve the space science curriculum

Computer and Programming Experience:

Operating Systems and Platforms:

- Unix (Linux, Solaris, AIX, IRIX) on Intel, Sun, Power3/4, SGI Origin
- WinNT, Win9x, Win3.1, DOS

Programming Languages:

- C++, C (preferred)
- Pascal, Basic, Fortran77, Java, Scripting Languages (sh, Python, PHP)

Applications: GNU compilers, PGI compilers, IBM (XL) compilers, MPI, GNU tools, XEmacs, L^AT_EX, gnuplot, AVS and others.

Professional Work Experience: Building a web-based telephone conference call application for d.o.m. GmbH, Köln, Germany (2 months).

System Administration:

- Installing/maintaining departmental email/web servers in my workplaces in Germany as well as at the University of New Hampshire.
- Installing/maintaining Beowulf-type Linux clusters, a 32 processor AMD Athlon cluster *zephyr* at the University of Iowa, and now a 320 processor AMD Opteron cluster *zaphod* at the University of new Hampshire.

Linux Experience:

- Three years experience in maintaining and developing the ISDN subsystem in the Linux kernel.
- Reimplementation of the Linux kernel build system during the development phase of kernel 2.5.
- Working with (and being part of) the Linux community, understanding the software engineering process and implementing it, as shown in an email posting by Linus Torvalds:

<http://groups.google.com/groups?q=g:thl1057092984d&dq=&hl=en&lr=&ie=UTF-8&oe=UTF-8&selm=linux.kernel.adenp5%241d9%241%40penguin.transmeta.com>

From: Linus Torvalds (torvalds@transmeta.com)
Subject: Re: KBuild 2.5 Impressions
Date: 2002-06-02 21:20:22 PST

[...]

- Kai has already shown that he can merge with me easily, and actually took one traditional flag-day-project (ISDN: every single merge was a flag-day merge), and has turned that into a very easy gradual merge for me. I used to dread ISDN merges, these days I don't even have to think about them.
- Kai obviously already knows the build system, as he has been doing a lot of incremental stuff on it already.
- Kai isn't an enthusiastic kbuild-2.5 supporter. In fact, he tends to be a bit down on some of it. Which is a plus in my book: it means that whatever Kai tries to push my way I'll feel just that much more comfortable with as having had critical review.

[...]

Service:

- 2009: NSF/CISE review panel, Washington, DC
- 2009: In charge of creating a Center for Scientific Computing at UNH / Alliance with IBM
- 2008-2009: Graduate advisor
- 2008-2009: Member of computer committee, Dept. of Physics, UNH
- 2008-2009: Member of graduate curriculum committee, Dept. of Physics, UNH
- 2008: Member of search committee for an Applied Maths position at the College of Staten Island (CSI)
- 2008: Member of the organizational committee for CSI's participation in the World Science Festival
- 2008: Participation in the Dept of Computer Science Majors' Day
- 2008: Participation in CSI's Deans' List Ceremony

Languages:

German, English (fluent)
Mandarin Chinese (beginning)

**Recent
Presentations
and
Conferences:**

- Mar 2009: Participation in DOE Workshop on Extreme Scale Computing, Washington, DC
- Feb 2009: Invited talk at Minisymposium, SIAM CS&E conference, Miami, FL
- Dec 2008: Talk at the AGU meeting, San Francisco, CA
- Nov 2008: Invited Talk at the APS/DPP meeting, Dallas, TX
- Aug 2008: Seminar at Max-Planck Institute, Garching, Germany
- Jul 2008: Poster at EPSCoR meeting at Oakridge National Lab, TN
- Jul 2008: Talk at the CICART review meeting, UNH
- Jun 2008: Talk at the ASTRONUM 2008 conference, St. Thomas, US V.I.
- May 2008: Poster at LCI International Conference on High-Performance Clustered Computing, Champaign, IL
- Dec 2007: Poster at the PetaApps meeting at University of Colorado, Tempe
- Nov 2007: Talk at the Applied Maths / Applied Physics Seminar at Columbia University.
- Nov 2007: Poster at the APS/DPP Meeting in Orlando, Florida
- Oct 2007: Participation in the OpenGGCM workshop at UNH
- Oct 2007: Talk at the CICART (Center for Integrated Computation and Analysis of Reconnection and Turbulence) inaugural meeting
- Jul 2007: Talk at the Institute for Theoretical Physics I, Ruhr-University Bochum, Germany
- Apr 2007: Talk at the College of Staten Island, City University of New York
- Nov 2006: Invited talk at APS Fluid Dynamics Annual Meeting, Tampa, FL
- Nov 2006: Poster at APS/DPP Meeting in Philadelphia, PA
- Jul 2006: Invited talk at SIAM annual meeting, Boston, MA
- Mar 2006: Talk at IGPP/ASTRONUM-2006 conference, Palm Springs, CA

- Publications:** P. Zhu, C. C. Hegna, C. R. Sovinec, A. Bhattacharjee, and K. Germaschewski
Intermediate Nonlinear Regimes of Line-tied g-Mode and Ballooning Instability, Nuclear Fusion (under review)
- K. Germaschewski, J. Raeder, D. Larson, and A. Bhattacharjee
New Developments in Modeling MHD Systems on High Performance Computing Architectures, in: Numerical Modeling of Space Plasma Flows: ASTRONUM-2008, ASP Conference Series **408**, 2009, pp. 223-230
- P. Zhu, J. Rader, K. Germaschewski, and C. C. Hegna
Initiation of ballooning instability in the near-Earth plasma sheet prior to the 23 March 2007 THEMIS substorm expansion onset, Annales Geophysicae, **27** (3), 2009, pp. 1129-1138
- C.-S. Ng, D. Rosenberg, K. Germaschewski, A. Pouquet, and A. Bhattacharjee
A comparison of spectral element and finite difference simulations with adaptive mesh refinement for the MHD island coalescence instability problem, Astrophys. J. Suppl. **177** (2008) 613-625
- P. Zhu, C.C. Hegna, C.R. Sovinec, A. Bhattacharjee, and K. Germaschewski
Intermediate nonlinear regime of a line-tied g mode, Physics of Plasmas **14**, 055903 (2007).
- Zhu, P., C. R. Sovinec, C. C. Hegna, A. Bhattacharjee, and K. Germaschewski
Nonlinear ballooning instability in the near-Earth magnetotail: Growth, structure, and possible role in substorms, J. Geophys. Res., **112**, A06222 (2007)
- P. Zhu, A. Bhattacharjee, and K. Germaschewski
Intermediate nonlinear evolution of the Parker instability: Formation of convection-induced discontinuities and absence of finite-time singularities, Phys. Rev. Lett., **96**, 065001, (2006)
- K. Germaschewski, A. Bhattacharjee, and C.-S. Ng
The Magnetic Reconnection Code: an AMR-based fully implicit simulation suite, in: Numerical Modeling of Space Plasma Flows, ASP Conference Series, Vol. 359 (2006) N. B. Pogorelov and G. P. Zank (Eds.)
- A. Bhattacharjee, K. Germaschewski, and C. S. Ng
Current singularities: Drivers of impulsive reconnection
Physics of Plasmas **12** (2005) 042305

K. Germaschewski, A. Bhattacharjee, Rainer Grauer, David Keyes, and Barry Smith

Using Krylov-Schwarz methods in an adaptive mesh refinement environment
in: Adaptive Mesh Refinement - Theory and Applications, Series : Lecture Notes in Computational Science and Engineering , Vol. 41 (2005) Plewa, Tomasz; Linde, Timur; Weirs, V. Gregory (Eds.)

C. S. Ng, A. Bhattacharjee, K. Germaschewski, and S. Galtier

Anisotropic fluid turbulence in the interstellar medium and solar wind
Physics of Plasmas **10** (2003) 1954

J. Kleimann, H. Fichtner, A. Kopp, K. Germaschewski, and R. Grauer

On the dynamics of the solar corona: the numerics behind a self-consistent 3D MHD Model

Proc. 10th. European Solar Physics Meeting, 'Solar Variability: From Core to Outer Frontiers', Prague, Czech Republic, 9-14 September 2002 (ESA SP-506, December 2002) 51-54

J. Kleimann, H. Fichtner, A. Kopp, K. Germaschewski, and R. Grauer

On the dynamics of the solar corona: first results obtained with a new 3D MHD Model

Proc. 10th. European Solar Physics Meeting, 'Solar Variability: From Core to Outer Frontiers', Prague, Czech Republic, 9-14 September 2002 (ESA SP-506, December 2002) 21-24

L. Bergé, K. Germaschewski, R. Grauer, and J. Juul Rasmussen

Hyperbolic shock waves of the optical self-focusing with normal GVD
Phys. Rev. Lett. **89** (2002) 153902.

K. Germaschewski, R. Grauer, L. Bergé, V.K. Mezentsev, and J. Juul Rasmussen

Splittings, coalescence, bunch and snake patterns in the 3-D nonlinear Schrödinger equation with anisotropic dispersion
Physica D **151** (2001) 175-198.

K. Germaschewski and R. Grauer

Longitudinal and transversal structure functions in two-dimensional electron magnetohydrodynamic flows
Physics of Plasmas **6** (1999) 3788-3793

R. Grauer, C. Marliani, and K. Germaschewski

Adaptive mesh refinement for singular solutions of the incompressible Euler equations
Phys. Rev. Lett. **84** (1998) 4850-4853.