

Curriculum Vitae

Personal Details

Name: Aleš Janka
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Sex: male
Nationality: Czech

Education and Research

since Sep 2006 Université de Fribourg (Suisse), research and teaching assistant
Département de Mathématiques, groupe de Mathématiques Appliquées
Feb 2004–August 2006 Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland
Chaire d'Analyse et de Simulation Numérique, Post-doc
Fast solvers for magneto-hydro-dynamics (aluminium electrolysis)
Swiss CTI grant no. 6437.1 IWS-IW and Alcan-Péchiney
Jan 2003–Feb 2004 INRIA Sophia Antipolis, France, project OPALE, Post-doc
Shape optimization of aerodynamic bodies
Multilevel adaptive shape parametrizations
Project “Supersonique” of French Ministries of Research and Transport
March–Dec 2002 INRIA Sophia Antipolis, France, project SMASH, Post-doc
Automatic mesh-coarsening techniques for geometric multigrid methods
Contract “Development of multigrid methods for convergence acceleration of solvers for compressible Navier-Stokes equations on non-structured meshes” with Dassault Aviation
1998–March 2002 INRIA Sophia Antipolis, France, project SINUS
Docteur ès Sciences, spécialité mathématiques, mention: très honorable
“Multigrid methods for compressible Navier-Stokes equations”
1993–1998 University of West Bohemia at Plzeň, Czech Republic
Five-year master’s degree in engineering (Ing.)
Faculty of Applied Sciences, Numerical Mathematics
Final dissertation on “Schwarz overlapping domain decomposition with coarse-space appropriate for linear elasticity operator ”
1996–1997 4th year of University (6 months) at Hull University, UK
scholarship of the European Union exchange programme TEMPUS

Achievements

- Winner of prof. Babuška’s prize in 1998 (awarded by the Mathematical Institute of the Czech Academy of Science for the best student research work in Applied Mathematics)
- Award of Škoda, Nuclear machinery in 1998 for the best master thesis
- Ranked first in the selection of candidates for the permanent job 26MCF3462 “maître de conférences” at the prestigious Laboratoire J.L. Lions, Université Paris 6 in May-June 2006. At the end, however, I preferred to stay in Switzerland. (Ref.: Prof. A. Cohen, president of the selection committee).

My successful grant proposals

- Germaine de Staël grant of SATW for 2010/11, “Plant growth mechanics”, project of collaboration between Universities of Fribourg, Bern and INRIA Virtual Plants in Montpellier.
- Sciex-NMS grant of CRUS for 2010/11, “Mechanical modelling of plant growth”.

Research topics (see “Research statement” for more detail)

- Numerical analysis:
- iterative solvers for linear systems, convergence estimations,
 - domain decomposition methods and multigrids, convergence properties,
 - finite volume and finite element methods, error estimations,
- Optimization:
- external problems for electromagnetism (project with Alcan-Péchiney),
 - shape-parametrizations of 3D geometries by Free-Form Deformation,
 - multi-level optimization for aeronautics (contract “Supersonique”),
 - descent methods, BFGS, gradient by adjoint states,
 - simplex algorithms, evolutionary algorithms,
 - multi-criteria optimization (Pareto or Nash),
- Mesh generation:
- automatic coarsening of anisotropic non-structured 3D meshes, for geometrical multigrid methods (contract with Dassault Aviation),
 - anisotropic mesh-generation by optimization of element quality (in collaboration with CEMEF, Ecole de Mines de Paris at Sophia Antipolis, Dr. Thierry Coupez).
- Bio-mechanics:
- modelling of plant cell tissue
 - growth in the continuum mechanics theory

Other activities for the scientific community

- since 2009
- Member of SPEEDUP Society – the Swiss forum for Grid and High Performance Computing, program committee for SPEEDUP workshops 2009, 2010, 2011, <http://www.speedup.ch/>
- since 2009
- Webmaster of the Departement of Mathematics, Université de Fribourg
- April 2008
- Organisation, on the behalf of Prof. J-P. Berrut (Université de Fribourg), of the Colloque Numérique Suisse/Schweizer Numerik Kolloquium 2008, April 25, 2008, about 100 participants.
- April 2006
- Organisation, on the behalf of Prof. J. Rappaz (EPFL), of the Colloque Numérique Suisse/Schweizer Numerik Kolloquium 2006, April 12, 2006, about 120 participants.

Skills and Interests

- Computers:
- program languages and tools: Fortran 77, C/C++, Matlab/Octave
 - parallel computing and algorithms, message passing (MPI, PVM)
 - finite-element software
 - word-processing and publishing: \LaTeX , MS-Word, creation of web pages
 - every-day UNIX/Linux user and administrator
- Languages:
- English, French fluent
 - German advanced but not practiced
 - Russian passive knowledge
 - Italian introductory course
 - Czech mother tongue

Reviewed articles in journals and theses

- [1] Flueck, M.; Hofer, T.; Janka, A.; Rappaz, J.: Numerical methods for ferromagnetic plates, Applied and numerical partial differential equations, *Comput. Methods Appl. Sci.* 15 (2010), 169–182.
- [2] Flueck, M.; Janka, A.; Laurent, C.; Picasso, M.; Rappaz, J.; Steiner, G.: Some mathematical and numerical aspects in aluminum production, *J. Sci. Comput.* 43 (2010), no. 3, 313–325.
- [3] Guillard, H.; Janka, A. and Vaněk, P.: Analysis of an algebraic Petrov-Galerkin smoothed aggregation multigrid method. *Appl. Numer. Math.* 58 (2008), no. 12, 1861–1874.
- [4] Janka, A.: Smoothed aggregation multigrid for a Stokes problem, *Comput. Vis. Sci.* 11 (2008), no. 3, 169–180.
- [5] Janka, A.: A domain decomposition solver for ferromagnetism, *Math. Comput. Simulation* 76 (2007), no. 1-3, 86–93.
- [6] Désidéri, J-A.; Abou el Majd, B.; Janka, A.: Nested and self-adaptive Bézier parameterizations for shape optimization, *J. of Comput. Physics* 224 (2007), no. 1, 117–131.
- [7] Janka, A.: A flux correction multigrid for compressible flow, *Numer. Algorithms* 33 (2003), no. 1-4, 319–330.
- [8] Janka, A.: Algebraic domain decomposition solver for linear elasticity, *Appl. Math.* 44 (1999), no. 6, 435–458.
- [9] Janka, A.: Multigrid methods for compressible laminar flow, PhD thesis, Université de Nice, defended on March 1, 2002, <http://www.inria.fr/rrrt/tu-0711.html>
- [10] Janka, A.: Overlapping Schwarz Domain Decomposition with Coarse Space Appropriate to Linear Elasticity, University of Pilsen, Master thesis 1998.

Selection of international conferences

- [1] A. Janka: A volume agglomeration multigrid method using flux correction, in: “The Second IMACS conference on Mathematical Modelling and Computational Methods in Applied Sciences and Engineering”, June 2001 Pilsen, Czech Republic.
- [2] A. Janka: A volume agglomeration multigrid by flux correction for Navier-Stokes equation, in: “International Conference on Numerical Algorithms”, Marrakech, October 2001.
- [3] J-A. Désidéri, A. Janka, M. Andreoli.: Hierarchical Parameterization for Multilevel Evolutionary Shape Optimization with Application to Aerodynamics, in: “Evolutionary Methods for Design, Optimization and Control with Applications to Industrial and Societal Problems”, International Center for Numerical Methods in Engineering (CIMNE), Barcelona, Spain, 2003, Proc. of EUROGEN 2003, Barcelona, September 15-17, 2003.
- [4] J-A. Désidéri, A. Janka.: Aerodynamic Wing-Shape Optimization by an Adaptive Multi-Level Algorithm, in: “The Fifth European Conference on Numerical Mathematics and Advanced Applications (ENUMATH 2003)”, Prague (Czech Republic), August 18-22, 2003.
- [5] J-A. Désidéri, A. Janka.: Multilevel Shape Parameterization for Aerodynamic Optimization - Application to Drag and Noise Reduction of Transonic/Supersonic Business Jet, in: “European Congress on Computational Methods in Applied Sciences and Engineering, ECCOMAS 2004, Jyväskylä, Finland”, 24-28 July 2004.
- [6] D. Pinelli, G. Sacco, C. Lanari, J-A. Désidéri, A. Janka.: Multipoint Aerodynamic Optimization of A Transonic Business Jet Wing, in: “European Congress on Computational Methods in Applied Sciences and Engineering, ECCOMAS 2004, Jyväskylä, Finland”, 24-28 July 2004.
- [7] J-A. Désidéri, J-P. Zolésio, B. Abou el Majd, A. Janka.: Inverse Shape Optimization Model Problems and Multi-Level Geometrical Optimization Methods, in: “International Conference on Control, PDEs and Scientific Computing, Beijing, PR China”, September 13-16 2004.
- [8] A. Janka: A domain decomposition solver for ferro-magnetism, in: “The Third IMACS conference on Mathematical Modelling and Computational Methods in Applied Sciences and Engineering”, 4-8 July 2005 Pilsen, Czech Republic.

- [9] A. Janka: Algebraic multigrid method by smoothed agglomeration for a Stokes problem, in: “The Eighth European Multigrid Conference”, Den Haag – Scheveningen, The Netherlands, September 27-30, 2005.
- [10] A. Janka: Smoothed aggregation multigrid for incompressible flows, in: “The Sixth International Congress on Industrial and Applied Mathematics (ICIAM 07)”, Zürich, Switzerland, July 16-20, 2007.

Research reports

- [1] Michele Andreoli, Aleš Janka, Jean-Antoine Désidéri: Free-form-deformation parameterization for multilevel 3D shape optimization in aerodynamics, INRIA Research Report no. 5019, November 2003.
- [2] Latifa Oulladji, Aleš Janka, Jean-Antoine Désidéri and Alain Dervieux: Optimisation aérodynamique par algorithmes génétiques hybrides: application à la réduction d’un critère de bang sonique, INRIA Research Report no. 4884, July 2003.
- [3] Xuejun Xu, Aleš Janka and Jean-Antoine Désidéri: Cascadic multigrid for the advection-diffusion equation, INRIA Research Report no. 4574, October 2002.
- [4] Petr Vaněk, Aleš Janka and Hervé Guillard: Convergence of Algebraic Multigrid Based on Smoothed Aggregation II: Extension to a Petrov-Galerkin Method, INRIA Research Report no. 3683, May 1999.

References

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