

Curriculum Vitae

Education

- THE UNIVERSITY OF TEXAS AT AUSTIN, Austin, TX, U.S.A.
Ph.D., Computational Science, Engineering and Mathematics Dec 2012
Dissertation: *Modeling bone conduction of sound in the human head using hp-finite elements*
Advisor: Professor Leszek F. Demkowicz
- UNIVERSITÀ DEGLI STUDI DI PAVIA, Pavia, Italy
M.S., Applied Mathematics Oct 2006
Thesis: *Finite Elements on Distorted Hexahedra for the Approximation of the $H(\text{div})$ space*
Advisor: Professor Daniele Boffi
- B.S., Mathematics Dec 2003
Thesis: *Numerical Solution of the Laplace Equation via Mixed Finite Elements*
Advisor: Professor Daniele Boffi

Employment

- TECHNICAL UNIVERSITY OF VIENNA, Vienna, Austria
Senior Lecturer Feb 2020–present
- RWTH AACHEN UNIVERSITY, Aachen, Germany
Permanent AICES Postdoctoral Fellow Dec 2017–Feb 2020
Postdoctoral Assistant Nov 2016–Nov 2017
- ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE, Lausanne, Switzerland
Postdoctoral Assistant Sep 2014–Oct 2016
- BROWN UNIVERSITY, Providence, RI, U.S.A.
Postdoctoral Research Associate May 2013–Aug 2014
- THE UNIVERSITY OF TEXAS AT AUSTIN, Austin, TX, U.S.A.
Postdoctoral Fellow Jan 2013–Apr 2013

Awards & Distinctions

THE INSTITUTE FOR COMPUTATIONAL ENGINEERING AND SCIENCES: NIMS fellowship for academic year 2011–12.

C.I.M.E. FOUNDATION: scholarship to attend a summer school in Cetraro, Italy, summer 2006.

UNIVERSITÀ DEGLI STUDI DI PAVIA: scholarship to visit Princeton University, summer 2005.

ALMO COLLEGIO BORROMEO: scholarship to visit Princeton University, summer 2005.

Teaching Experience

Primary Instructor *summer semester 2017, 2018, 2019*

- “Mathematical Theory of Finite Element Methods and Fast Iterative Solvers”, graduate level course at RWTH Aachen.

Teaching Assistant *Jan 2015–Jun 2015*

- “Analysis II” (MATH-106), undergraduate level course at EPFL.

Teaching Assistant *Aug 2009–Dec 2009*

- “Dynamics” (EM 311M), undergraduate level course at UT Austin.

SEMINARS AND CONFERENCES

Invited Talks

- *Efficient preconditioning of hp-FEM matrices by hierarchical low-rank approximation.* 31th Chemnitz FEM Symposium, Chemnitz, Germany, September 2018.
- *Approximation of the fractional Laplacian via hp-finite elements.* 30th Chemnitz FEM Symposium, Strobl, Austria, September 2017.
- *Efficient preconditioning of hp-FEM matrices by hierarchical low-rank approximation.* Center for Computational Science and Engineering, RWTH University, Aachen, Germany, September 2016.
- *Efficient preconditioning of hp-FEM matrices by hierarchical low-rank approximation.* High Order Finite Elements and Isogeometric Methods, Jerusalem, Israel, June 2016.
- *hp-Finite elements for coupled problems.* High Order Finite Elements and Isogeometric Methods, Frauenchiemsee Island, Germany, June 2014.
- *hp-Finite elements for coupled problems: an overview of our latest 3-dimensional code.* High Order Finite Elements and Isogeometric Methods, Krakow, Poland, June 2011.

Contributed Talks & Seminars

- *Efficient preconditioning of hp-FEM matrices by hierarchical low-rank approximation.* US-NCCM 15, Austin, TX, U.S.A., August 2019.
- *Latest developments of the Polarizable Continuum Model within a domain-decomposition paradigm.* MOANSI Workshop, Aachen, Germany, October 2017.
- *Efficient preconditioning of hp-FEM matrices by hierarchical low-rank approximation.* Coupled Problems 2017, Rhodes, Greece, June 2017.
- *Efficient preconditioning of hp-FEM matrices by hierarchical low-rank approximation.* EC-COMAS Congress 2016, Crete, Greece, June 2016.

-
- *A low-rank compression preconditioner.* CERECAM Seminar, Cape Town, Republic of South Africa, August 2015.
 - *Reduced rank preconditioners.* USNCCM 13, San Diego, CA, USA, July 2015.
 - *A preconditioner based on low-rank approximation of Schur complements.* MATHICSE Retreat, Leysin, Switzerland, July 2015.
 - *Modeling bone conduction of sound in the human head using hp-finite elements.* Division of Applied Mathematics Seminar, Brown University, Providence, RI, U.S.A., May 2013.
 - *hp-Finite elements for coupled problems.* Finite Element Rodeo, Houston, TX, U.S.A., March 2012.
 - *hp-Finite elements for coupled problems.* Finite Element Rodeo, College Station, TX, U.S.A., February 2011.
 - *hp-Finite elements for electromagnetics and bio-heat transfer simulation.* The 10th International Workshop on Finite Elements for Microwave Engineering (FEM 2010), Meredith, NH, U.S.A., October 2010.
 - *hp-Finite elements for bone conduction of sound in the human head.* Non-Standard Numerical Methods for PDE's, Pavia, Italy, June 2010.
 - *hp-Finite elements for bone conduction of sound in the human head.* Finite Element Rodeo, Dallas, TX, U.S.A., March 2010.
 - *Construction of H^1 -conforming hierarchical shape function for elements of all shapes and transfinite interpolation.* The Mathematics of Finite Elements and Applications (MAFELAP), London, UK, June 2009.
 - *Transfinite interpolation and construction of shape functions.* ICES Seminar, Austin, TX, U.S.A., February 2009.
 - *Transfinite interpolation and construction of shape functions.* Finite Element Rodeo, Austin, TX, U.S.A., February 2009.

Referee Activity

Journal of Computational Physics; Computer Methods in Applied Mechanics and Engineering; Journal of Scientific Computing; SIAM Journal on Scientific Computing; Computers and Mathematics with Applications

References

JAN S. HESTHAVEN
 Dean of the School of Basic Sciences
 Chair of Computational Mathematics and Simulation Science
 École Polytechnique Fédérale de Lausanne
phone: +41 (0)21 693 0351
email: jan.hesthaven@epfl.ch

J. TINSLEY ODEN
 Associate Vice President for Research
 Founding Director, Institute for Computational Engineering and Sciences (ICES)
 Cockrell Family Regents' Chair in Engineering No. 2

Peter O'Donnell Jr. Centennial Chair in Computing Systems
Professor of Aerospace Engineering and Engineering Mechanics
Professor of Computer Science
Professor of Mathematics
The University of Texas at Austin
phone: +1 (512) 471-3312
email: `oden@ices.utexas.edu`

LESZEK F. DEMKOWICZ
Professor of Aerospace Engineering and Engineering Mechanics
W.A. "Tex" Moncrief, Jr. Chair in Computational Engineering and Sciences II
Professor of Mathematics
Assistant Director, Institute for Computational Engineering and Sciences (ICES)
The University of Texas at Austin
phone: +1 (512) 471-4199
email: `leszek@ices.utexas.edu`

JOACHIM SCHÖBERL
Chair of Computational Mathematics in Engineering
Institute for Analysis and Scientific Computing
Vienna University of Technology
phone: +43 1 58801 10128
email: `joachim.schoeberl@tuwien.ac.at`

Publications

- [1] B. Stamm, L. Lagardère, G. Scalmani, P. Gatto, E. Cancès, J-Ph. Piquemal, Y. Maday, B. Mennucci, F. Lipparini. “How to Make Continuum Solvation Incredibly Fast in a Few Simple Steps: a Practical Guide to the Domain-Decomposition Paradigm for the Conductor-like Screening Model.” *International Journal of Quantum Chemistry*, Vol. 119, Issue 1, 2018.
- [2] P. Gatto, F. Lipparini, B. Stamm. “Computation of Forces Arising from the Polarizable Continuum Model within the Domain-Decomposition Paradigm.” *The Journal of Chemical Physics*, 147, 224108, 2017.
- [3] P. Gatto, R.E. Christiansen, J.S. Hesthaven. “Efficient Preconditioning of hp -FEM Matrix Sequences with Slowly Varying Coefficients: an Application to Topology Optimization.” *Computer Methods in Applied Mechanics and Engineering*, Vol. 322, Issue 0045–7825, pp. 81-96, 2017.
- [4] P. Gatto, J.S. Hesthaven. “Efficient Preconditioning of hp -FEM Matrices by Hierarchical Low-Rank Approximations.” *Journal of Scientific Computing*, 1573-7691 (1–32), 2017.[†]
- [5] P. Gatto, J.S. Hesthaven. “Numerical Approximation of the Fractional Laplacian via hp -finite Elements, with an Application to Image Denoising.” *Journal of Scientific Computing*, 0885-7474 (1–22), 2014.[†]
- [6] P. Gatto, L. Demkowicz. “Modeling Bone Conduction of Sound in the Human Head: II. Simulation Results.” *Journal of Computational Acoustics*, Volume 21, Number 04, 2013.[†]
- [7] L. Demkowicz, P. Gatto, J. Kurtz, M. Paszynski, W. Rachowicz, E. Bleszynski, M. Bleszynski, M. Hamilton, C. Champlin, D. Pardo. “Modeling of Bone Conduction of Sound in the Human Head Using hp -finite Elements: Code Design and Verification.” *Computer Methods in Applied Mechanics and Engineering*, 200 (21-22): 1757–1773, 2011.[†]
- [8] R.S. Falk, P. Gatto, P. Monk. “Hexahedral $H(\text{div})$ and $H(\text{curl})$ Finite Elements.” *ESAIM: Mathematical Modeling and Numerical Analysis*, January 2011: pp 115–143.[†]
- [9] P. Gatto, L. Demkowicz. “Construction of H^1 -conforming Hierarchical Shape Functions for Elements of all Shapes and Transfinite Interpolation.” *Finite Elem. Anal. Des.*, Vol. 46, Issue 6, June 2010: pp 474–486.
- [10] L. Demkowicz, P. Gatto, W. Qiu, A. Joplin. “ G^1 -interpolation and Geometry Reconstruction for Higher Order Finite Elements.” *Computer Methods in Applied Mechanics and Engineering*, 198 (13-14): 1198–1212, March 2009.