BIOGRAPHICAL SKETCH - Christoph Brehm - OCT 2016

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Professional Preparation:

Universität Stuttgart, Germany	Aerospace Engineering	Dipl. Ing.	2005
University of Arizona, Tucson, AZ	Aerospace Engineering	M.S.	2006
University of Arizona, Tucson, AZ	Aerospace Engineering	Ph.D.	2011

Appointments and Experience:

Aug. 2016– current:	Assistant Professor, Dept. of Mech. Engin., University of Kentucky
Oct. 2015–Aug. 2016:	Research Assistant Professor, Dept. of Aero. Engin., University of Arizona
Jan. 2012–Oct. 2015:	Senior Research Scientist, STC, at Advanced Supercomputing Division, NASA-ARC, Moffett Field, CA

Recent Journal Publications:

- **C. Brehm**, "On Consistent Boundary Closures for Compact Finite-Difference WENO Schemes", Journal of Computational Physics, 2016, in press

- M.F. Barad, **C. Brehm**, C.C. Kiris, and R. Biswak,"Parallel adaptive high-order CFD simulations characterising SOFIA cavity acoustics", International Journal of Computational Fluid Dynamics, 2016, Volume 0, 1-7

- C. Kiris, M. Barad, J. Housman, **C. Brehm**, E. Sozer, and S. Moini-Yekta, "The LAVA Computational Fluid Dynamics Solver", Aerospace Science and Technology, 2016, Volume 55, 189-219

- **C. Brehm**, J. A. Housman, and C. C. Kiris, "Noise Generation Mechanisms for a Supersonic Jet Impinging on an Inclined Plate", Journal of Fluid Mechanics, 2016, Volume 797, 802-850

- **C. Brehm**, C. Hader, and H. F. Fasel,"A Locally Stabilized Immersed Boundary Method for the Compressible Navier-Stokes Equations", Journal of Computational Physics, 2015, Volume 295, 475-504

- **C. Brehm**, M. Barad, J. A. Housman, and C. C. Kiris,"A Comparison of Higher-Order Shock Capturing Finite Difference Schemes", Computer and Fluids Journal, 2015, Volume 122, 184-208

- **C. Brehm**, and H. F. Fasel, "Novel Concept for the Design of Immersed Interface Methods", Journal of Computational Physics, 2013, Volume 242, 234-267

- **C. Brehm**, A. Gross and H. F. Fasel,"Open-Loop Flow Control Investigation for Airfoils at Low Reynolds Numbers", AIAA Journal, 2013, Volume 51, 1843-1860

- J. A. Housman, **C. Brehm**, and C. Kiris,"Towards Jet Acoustic Prediction Within the Launch Ascent and Vehicle Aerodynamics framework", The Journal of the Acoustical Society of America, 2013, Volume 134

Recent Talks and Presentations:

- **C. Brehm**, M. Barad and C. Kiris, "An Immersed Boundary Method for Solving the Compressible Navier-Stokes Equations with Fluid-Structure Interaction," 34th AIAA Applied Aerodynamics Conference, 15-17 June, 2016, Washington, DC

- **C. Brehm**, M. Barad and C. Kiris, "Open Rotor Computational Aeroacoustic Analysis with an Immersed Boundary Method," 54th AIAA Aerospace Sciences Meeting, 4-8 January, 2016, San Diego, CA

- **C. Brehm**, "A Locally Stabilized Higher-Order Immersed Boundary Method and its Application to NASA Relevant Flow Problems," von Karman Institute, February 29, 2016, Belgium
- **C. Brehm**, J. A. Housman, C. C. Kiris and F. Hutcheson, "Noise Characteristics of a Four Jet Impingement Device Inside a Broadband Engine Noise Simulator," 21st AIAA/CEAS Aero-Acoustics Conference, 22-26 June, 2015, Dallas, Texas
- **C. Brehm**, M. Barad, and C. Hader, "A High-Order Immersed Interface Method for Compressible Flows", 7th AIAA Theoretical Fluid Mechanics Conference, 16-20 June, 2014, Atlanta, Georgia
- **C. Brehm**, S. Moini-Yekta, M. Barad, J. Housman, E. Sozer, and C. Kiris, "Partially-Dressed, Cavity-Closed Nose Landing Gear Noise Predictions With LAVA," 3rd AIAA Workshop on Benchmark Problems for Airframe Noise Computations, 14-15 June, 2014, Atlanta, Georgia
- **C. Brehm**, "A Comparison of Higher-Order Finite-Dierence Shock Capturing Schemes," Applied Modeling and Simulation Seminar Series, August 19, 2014, NASA Ames, Moett Field, CA

Personal Statement:

His Ph.D. research included the development of a higher-order accurate Immersed Boundary Method (IBM) for the Navier-Stokes and Maxwell equations. The method was based on a novel numerical concept for locally stabilizing the irregular finite difference stencils. He also devised a unique approach for analyzing biglobal stability problems for steady and unsteady base flows by solving an IVP as opposed to the computationally more EVP. In addition, he developed a highly versatile CFD solver featuring the novel IIM, Adaptive Mesh Refinement (AMR) and Fluid-Structure Interaction (FSI) capabilities. Among many other applications, he has utilized this solver to study the effect of porous walls on the hypersonic transition process. In 2012, he was employed by STC/NASA-ARC to join the newly founded LAVA group that was initiated to develop novel multi-physics CFD capabilities. He was selected to join this group because of his background in IIM, AMR, higher-order methods, turbulent flows, and FSI. Due to his experience at NASA, he understands the current challenges of CFD and multi-physics simulations. His current research on IBM and FSI is fully funded by NASA. His most recent accomplishments include an invited presentation to the chief of engineering for NASA's SLS program on a critical ignition over pressure analysis, and two NASA honor awards for his contributions to the LAVA framework and SLS buffet loads mitigation. At the AIAA BANC-III workshop, he received the Best Young Researcher Presentation award for a presentation on landing gear noise.

Other Activities:

- **Peer reviewer and panel review member for** Journal of Computational Physics, Computer and Fluids, International Journal of Computational Fluid Dynamics, American Institute of Aeronautics and Astronautics Journal.

- **Affiliations:** Member of Deutsche Physikalische Gesellschaft (DPG, German Physical Society, since 2000), American Institute of Aeronautics and Astronautics (AIAA) senior member (since 2006), Launch Ascent and Vehicle Aerodynamics (LAVA) group senior member

- **Awards and Scholarships:** Group Achievement Award at the 2012-2015 NASA Honor Awards Ceremonies; Best Young Researcher Presentation Award, 3rd AIAA BANC-III workshop, 2014; (BMPI)-BIO5 Scholarship, University of Arizona, sponsored by National Institute of Health, 2008-09; Frankfurt Airport Foundation Scholarship, 2006; DAAD (German Academic Exchange Service) ISAP Program Scholarship, 2005-2006; Hermann-Reissner Foundation Scholarship, 2005; Nominated by the University of Stuttgart for scholarship to Studienstiftung des Deutschen Volkes (German National Merit Foundation), 2003;