

Sven Schmitz

Assistant Professor

Department of Aerospace Engineering
The Pennsylvania State University, University Park, PA 16802
phone: 814-863-0778 email: sus52@engr.psu.edu

EDUCATION

Ph.D., Mechanical and Aeronautical Engineering, 2006, University of California Davis
Overall GPA: 4.00 / 4.00

Diploma Degree (Dipl. Ing.), Aerospace Engineering, 2002, RWTH Aachen, Germany

PROFESSIONAL EXPERIENCE

09/2010-present Assistant Professor
Department of Aerospace Engineering, The Pennsylvania State University

06/2006-08/2010 Post-Doctoral Research
Department of Mechanical and Aeronautical Engineering (MAE), UC Davis

Joint Research Interchange: NASA-Ames Research Center - UC Davis
“Development of a Hybrid CFD Method for Helicopter Hover Flows”

01/2007-12/2009 Consultant for CFD Method Development with General Electric Wind
Department of Mechanical and Aeronautical Engineering, UC Davis

Research Grant: General Electric Wind - UC Davis
“Development of an Engineering Wind Turbine Design Tool Using Hybrid CFD”

09/2002-06/2006 Doctoral Research
Department of Mechanical and Aeronautical Engineering (MAE), UC Davis

Dissertation:
“Coupling of Navier-Stokes Solver with Helicoidal Vortex Model for the
Computational Study of Horizontal Axis Wind Turbines”

Advisor: Prof. Jean-Jacques Chattot (Chair, MAE Department, UC Davis)

09/2001-06/2002 Diploma Thesis
EADS Space, Munich, Germany

Thesis:
“Numerical Simulation of the Flow in Cooling Channels of Rocket Combustion
Chambers using Coupled Simulation VADUCT”

09/2000-07/2001 Education Abroad Program**DAAD Fellowship (German Academic Exchange Service)**

Department of Mechanical and Aeronautical Engineering (MAE), UC Davis

Completed undergraduate and graduate course work towards Diploma degree.

Project Thesis on a student built RC airplane 'Aerobrick':

"Study of Take-off Roll, Propeller Analysis, and Propeller Design for the Aerobrick A'01"

10/1998-06/2000 Undergraduate Research

Biomedical Fluid Laboratory, Institute of Aerodynamics, RWTH Aachen, Germany

Designed parts of a durability tester for mechanical heart valves, conducted experiments, and maintained test stands.

RESEARCH INTERESTS**Basic and Applied Research in Computational Fluid Dynamics (CFD).**

- Development of Hybrid RANS/Vortex methodologies for wind turbines and helicopters.
- Design and optimization of wind turbine blades.
- Unsteady aerodynamic load prediction for wind turbine and helicopter blades.
- Wind turbine blade icing.

AWARDS and HONORS**Third M.I.T. Conference Young Researcher Fellowship Award** M.I.T., Cambridge MA, 2005

For exemplary research in the field of computational mechanics.

Professors for the Future Fellowship

Graduate Studies at UC Davis, 2005

Professors for the Future is a year-long competitive fellowship program designed to recognize and develop the leadership skills of outstanding graduate students and postdoctoral scholars who have demonstrated their commitment to professionalism, integrity, and academic service.

Joseph L. Steger Fellowship Award

UC Davis, 2004

For outstanding graduate work and achievement in Computational Fluid Dynamics (CFD).

Outstanding Graduate Student Teaching Award

Academic Senate at UC Davis, 2004

For contributions made towards the teaching and learning process at UC Davis.

TEACHING EXPERIENCE**Assistant Professor**

Aerospace Engineering, Penn State University

Fully responsible for lectures, labs, and exams.

- **Aerodynamics I, AERSP 311.** Fall 2012
Junior course, 101 students.
- **Introd. To Numeric. Methods in Fluid Dynamics, AERSP 423.** Spring 2012
Senior-elective course, 21 students.
- **Wind Energy Engineering and Projects, AERSP 497C.** Spring 2011/2012
Senior-elective course, 11 students (S'11), 14 students (S'12).
- **Wind Turbine Aerodynamics, AERSP 597B.** Spring 2011
Graduate course, 19 students.
- **Engineering of Wind Power Plants, AERSP 597C.** Fall 2011
Graduate course, 11 students.

Associate-Instructor

Mechanical and Aeronautical Engineering, UC Davis

Fully responsible for lectures, labs, and exams.

- **Thermodynamics, ENG 105.** Fall 2006
Upper-division course, 78 students.
- **Fundamentals of Heat Transfer, EME 165.** Summer Session 2005/2006, Spring 2006
Upper-division course, 24 students (SS'05), 53 students (S'06), 14 students (SS'06).
- **Applied Aircraft Aerodynamics, EAE 127.** Fall 2005
Upper-division course, 68 students.

Undergraduate Research Mentor

Mechanical and Aeronautical Engineering, UC Davis

- Developed and mentored undergraduate research projects for four students resulting in theses of more than 80 pages each, 2004-2009.

Teaching Assistant

Mechanical and Aeronautical Engineering, UC Davis

- Fundamentals of Heat Transfer, EME 165. Winter 2003/2004/2006, Spring 2004
- Applied Aircraft Aerodynamics, EAE 127. Fall 2002/2003/2004
- Theoretical and Computational Aerodynamics, EAE 126. Spring 2003

PUBLICATIONS**Peer-reviewed Journal Publications**

Yiqiang, H., Palacios, J., and **S. Schmitz**. 2012. Scaled Ice Accretion Experiments on a Rotating Wind Turbine Blade, *Journal of Wind Engineering and Industrial Aerodynamics* 109:55-67.

Schmitz, S., Bhagwat, M., Moulton, M. A., Caradonna F. X., and J. J. Chattot. 2009. The Prediction and Validation of Hover Performance and Detailed Blade Loads, *Journal of the American Helicopter Society* 54 032004 (12 pages).

Schmitz, S. 2009. On the Tip-Vortex Strength of Low-Drag Wings in Lifting-Line Theory, *Computational Fluid Dynamics Journal, Technical Note* 17:356-359.

Schmitz, S., and J. J. Chattot. 2007. Flow Physics and Stokes' Theorem in Wind Turbine Aerodynamics, *Computers and Fluids* 36:1583-1587, also in *Computational Fluid Dynamics 2006*, Springer :801-806.

Schmitz, S., and J. J. Chattot. 2007. Method for Aerodynamic Analysis of Wind Turbines at Peak Power, *AIAA Journal of Propulsion and Power, Technical Note* 23:243-246.

Schmitz, S., and J. J. Chattot. 2006. Characterization of Three-Dimensional Effects for the Rotating and Parked NREL Phase VI Wind Turbine, *ASME Journal of Solar Energy Engineering* 128:445-454.

Schmitz, S., and J. J. Chattot. 2006. A Coupled Navier-Stokes/Vortex-Panel Solver for the Numerical Analysis of Wind Turbines, *Computers and Fluids* 35:742-745, also in *Computational Fluid Dynamics 2004*, Springer :289-294.

Schmitz, S., and J. J. Chattot. 2005. A Parallelized Coupled Navier-Stokes/Vortex-Panel Solver, *ASME Journal of Solar Energy Engineering* 127:475-487.

Peer-reviewed Conference Proceedings

44th AIAA Aerospace Science Meeting and Exhibit. Reno NV, 01/2006

Schmitz, S., and J. J. Chattot. 2006. Characterization of Three-Dimensional Effects for the Rotating and Parked NREL Phase VI Wind Turbine, AIAA-2006-0392.

43rd AIAA Aerospace Science Meeting and Exhibit. Reno NV, 01/2005

Schmitz, S., and J. J. Chattot. 2005. Application of a Parallelized Coupled Navier-Stokes/Vortex-Panel Solver to the NREL Phase VI Rotor, AIAA-2005-0593, *A Collection of the 2005 ASME Wind Energy Symposium Technical Papers* :167-179.

Conference Proceedings, Presentations

50th AIAA Aerospace Sciences Meeting. Nashville TN, 01/2012

Jha, P.* , Brillembourg, D.* , and **S. Schmitz**. 2012. Wind Turbines under Atmospheric Icing Conditions – Ice Accretion Modeling, Aerodynamics, and Control Strategies for Mitigating Performance Degradation, AIAA-2012-1287.

- 64th Annual Meeting of the APS Division of Fluid Dynamics. Baltimore, MD, 11/2011
Schmitz, S. 2011. The Kutta-Zhukovsky Lift Theorem revisited: Alteration due to the Viscous Wake, (abstract) *Bulletin of the American Physical Society* :56(18):128.
- International Conference on Computational Fluid Dynamics. St. Petersburg, Russia, 07/2010
Suzuki, K., **Schmitz, S.**, and J. J. Chattot. 2010. Analysis of a Swept Wind Turbine Blade Using a Hybrid Navier-Stokes/Vortex-Panel Model, *Computational Fluid Dynamics 2010*, Springer :213-218.
- American Helicopter Society 66th Annual Forum. Phoenix, AZ, 05/2010
Schmitz, S., Bhagwat, M., and F. X. Caradonna. 2010. Physical and Numerical Issues in the Prediction of Free Wake Hover Performance, to be presented at the *American Helicopter Society 66th Annual National Forum*.
- 27th AIAA Applied Aerodynamics Conference. San Antonio TX, 06/2009
Schmitz, S., Bhagwat, M., and F. X. Caradonna. 2009. A Generalized Potential Method for Modeling Rotor Wake Flows, AIAA-2009-3856.
- ARO Rotorcraft Wake Prediction Basic Research Workshop. Georgia Tech, 03/2009
Bhagwat, M., Caradonna, F. X., and **S. Schmitz**. 2009. Some Applications and Developments of the Vorticity Embedded Potential Model for Rotor Flow, *Rotorcraft Wake Prediction Basic Research Workshop Proceedings* :327-336.
- American Helicopter Society 64th Annual Forum. Montreal, Canada, 04/2008
Bhagwat, M., Caradonna, F. X., **Schmitz, S.**, and M. A. Moulton. 2008. Similarity Scaling Trends Using a Hybrid CFD-based Hover Performance Tool, *American Helicopter Society 64th Annual National Forum Proceedings*.
- American Helicopter Society Aeromechanics Specialist's Conference. San Francisco CA, 01/2008
Schmitz, S., Chattot, J. J., Bhagwat, M., Moulton, M. A., and F. X. Caradonna. 2008. The Prediction and Validation of Hover Performance and Detailed Blade Loads.
- 46th AIAA Aerospace Sciences Meeting and Exhibit. Reno NV, 01/2008
Schmitz, S., Bhagwat, M., Moulton, M. A., and F. X. Caradonna. 2008. A Contour Coupling Methodology for Helicopter Hover Performance Analysis, AIAA-2008-0404.
- Third M.I.T. Conference on Computational Fluid and Solid Mechanics. M.I.T., 06/2005
Schmitz, S., and J. J. Chattot. 2005. Influence of the Vortical Wake behind Wind Turbines using a Coupled Navier-Stokes/Vortex-Panel Methodology, *Computational Fluid and Solid Mechanics 2005*, Elsevier Ltd. :832-836.
- 23rd AIAA Applied Aerodynamics Conference. Toronto, Canada, 06/2005
Schmitz, S., and J. J. Chattot. 2005. Wind Turbine Blade Aerodynamics of the NREL Phase VI Rotor near Peak Power, AIAA-2005-4850.

SERVICE ACTIVITY

Department:

Graduate Admissions Committee, September 2011 – Present

Computational Facilities Committee, September 2011 – Present

Wolk Thesis Award Selection Committee, Reviewing approx. 7 undergraduate research theses and nominating candidates for Wolk Thesis Award, February 2012 - Present

College:

Global Engineering Education (GLEE), September 2010 - Present

Engineering Faculty Council (EFC), September 2012 - Present

University:

Judge Annual Graduate Student Exhibition, March 2011/2012

Reviewer for:

AIAA Journal of Aircraft, 2008/2009/2010/2011

ASME Turbo Expo, 2009/2011

ASME Journal of Solar Energy Engineering, 2006/2012

Computers and Fluids, 2012

Energies, 2012

Journal of Fluid Mechanics, 2012

Journal of Renewable and Sustainable Energy, 2009/2010

Wind Energy, 2010/2011/2012

Member of the **Academic Federation at UC Davis**, 2007/2008/2009

PROFESSIONAL MEMBERSHIPS

Member of:

American Institute of Aeronautics and Astronautics (AIAA), since 2005

American Helicopter Society (AHS), since 2007

American Society for Engineering Education (ASEE), since 2010

American Physical Society (APS), since 2011