

# CURRICULUM VITAE

Prof. Dr.-Ing. Holger Foysi

## Personal Data:

Birth date and location: 02.09.1974 in Munich, Germany  
Citizenship: German  
Private Address: Im unteren Buden 1, 57250 Netphen  
Work Address: Lehrstuhl für Strömungsmechanik,  
Paul-Bonatz-Str. 9-11, D-57072 Siegen  
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## Professional background:

since 2015 Vice Dean, Faculty of Science and Technology, University of Siegen  
since 11/2011 Full Professor, Chair of Fluid Mechanics, University of Siegen  
2008/2009, 2010 Lectureship for "Transonic Aerodynamics", Aerospace Engineering,  
University of Applied Sciences, Aachen,  
9/2008-9/2013 Leader Emmy-Noether Research Group: Turbulent Mixing and  
Combustion in Compressible Shear Layers - Simulation and Control.  
08/2007-08/2008 Researcher, Institute of Aerodynamics and Chair of Fluid Mechanics,  
RWTH Aachen  
10/2005-08/2007 Visiting Scholar, UCSD San Diego (Feodor-Lynen Fellowship, Alexander  
von Humboldt-Foundation, Department of Mechanical and Aerospace  
Engineering)  
10/2000-10/2005 Researcher/PhD Candidate, Chair of Fluid Mechanics, TU Munich

## Education:

School: 1981-1985 Elementary School in Erding, Germany  
1985-1994 High School in Erding, Germany  
1994 Abitur  
Military Service: 1994-1995 Giebelstadt b. Würzburg (Ambulance)  
University: 1995-2000 Physics, Technical University of Munich  
Akademic Grades: 2000 Diploma in Technical Physics  
2005 Dr.-Ing. Topic: „Transport of Passive Scalars in Wall-  
bounded and Isotropic Compressible Turbulence“

## Merits and Distinctions:

03/2005 Dissertation/Promotion with distinction  
10/2005 Feodor-Lynen Research Fellowship, Alexander v. Humboldt Foundation  
07/2006 Willy Messerschmitt Prize of the Faculty of Engineering of the  
Technical University of Munich (Best Doctoral Thesis)  
09/2008 Emmy-Noether Research Fellowship of the German Research Foundation

## Research interests:

Turbulence, Direct Numerical Simulation, Large-Eddy Simulation, RANS, Aeroacoustics, Flow Control, Numerical Methods, Supersonic Flows and Compressibility Effects

### National and International Cooperations:

- Aerodynamic Institute, RWTH Aachen Technical University (Prof. Schröder, Dr. Meinke)
- Mechanical and Aerospace Engineering, UCSD San Diego (Prof. Sarkar)
- Aerospace Engineering, Indian Institute of Science, Bangalore (Prof. Mathew)
- Max Planck Institute for Meteorology, Hamburg (Dr. Mellado)
- Chair of Aerodynamics, TU Munich (Dr. Ghosh, Prof. Friedrich)
- Department of Mathematics, University of Wyoming (Prof. Heinz)

### Reviewer for:

- Journal of Fluid Mechanics
- Journal of Computational Physics
- Computers and Fluids
- International Journal of Heat and Fluid Flow
- European Journal of Mechanics B/Fluids
- Microfluidics and Nanofluidics
- International Journal of Spray and Combustion Dynamics
- German Research Foundation

### Additional Activities:

- Head of the IT Users Committee, University of Siegen

### 10 Selected Peer-Reviewed Publications:

[1] J. Mathew, R. Lechner, H. Foysi, J. Sesterhenn, R. Friedrich. An explicit filtering method for large-eddy simulation of compressible flows. **Physics of Fluids**, 15, 2003, pp. 2279-2289.

[2] H. Foysi, S. Sarkar and R. Friedrich. Compressibility effects and turbulence scalings in supersonic channel flow. **Journal of Fluid Mechanics**, 509, 2004, pp. 207-216

[3] J. Mathew, H. Foysi and R. Friedrich. LES of compressible flows via explicit filtering. – **Int. J. of Heat & Fluid Flow**, 27, Issue 4, pp. 594-602, 2006

[4] I. Mahle, H. Foysi, S. Sarkar & R. Friedrich. On the turbulence structure in inert and reacting compressible mixing layers. - **Journal of Fluid Mechanics**, 593, pp. 171-180, 2007

[5] H. Foysi, S. Sarkar. The compressible mixing layer: an LES study. - **Theoretical and Computational Fluid Dynamics**, 24(6), 565- , 2010

[6] S. Gosh, H. Foysi & R. Friedrich. Compressible Turbulent Channel and Pipe Flow: Similarities and Differences. - **Journal of Fluid Mechanics**, 648, pp. 155-181, 2010

[7] D. Marinc & H. Foysi. Investigation of a continuous adjoint-based optimization procedure for aeroacoustic control of plane jets. **Int. J. Heat and Fluid Flow**, 38, pp. 200-212, 2012

[8] S.R. Koh, G. Geiser, H. Foysi, W. Schröder. Impact of Inhomogeneous Density Distribution on Acoustic Sources in Turbulent Jets. - In: **ERCOFTAC Bulletin March 2012**, pp. 15-21

[9] C. Schaupp, R. Friedrich, H. Foysi, Transverse injection of a plane reacting jet into compressible turbulent channel flow. - **Journal of Turbulence**, 13, No. 24, pp. 1-40, 2012

[10] G. Chagelishvili, G. Khujadze, H. Foysi and M. Oberlack, "Spanwise reflection symmetry breaking and turbulence control: Plane Couette flow", **Journal of Fluid Mechanics**, 745 , p. 300, 2014

## Full List of Publications

Prof. Dr.-Ing. Holger Foysi  
Chair of Fluid Mechanics, Universität Siegen

- [1] H. Foysi and R. Friedrich. DNS of passive scalar transport in turbulent supersonic channel flow. – In: Proc. of the 3rd Turbulence and Shear Flow Phenomena Conference, Sendai, Japan, 2003, pp. 1121-1126.
- [2] H. Foysi, S. Sarkar and R. Friedrich. On Reynolds stress anisotropy in compressible channel flow. – In: Proc. of the 3rd Turbulence and Shear Flow Phenomena Conference, Sendai, Japan, 2003, pp. 1103-1108.
- [3] J. Mathew, R. Lechner, H. Foysi, J. Sesterhenn and R. Friedrich. An explicit filtering method for large-eddy simulation of compressible flows. *Physics of Fluids*, Vol. 15, 2003, pp. 2279-2289.
- [4] S. Sarkar, H. Foysi and R. Friedrich. On the turbulence structure in compressible turbulent isothermal channel flow. – In: *Direct and Large-Eddy Simulation V*, Kluwer Academic Publishers, 2004, pp. 405-412.
- [5] H. Foysi and R. Friedrich. Supersonic turbulent channel flow with passive scalar transport. – In: *Notes on Numerical Fluid Mechanics and Multidisciplinary Design*, Vol. 87, Springer Verlag, 2004, pp. 350-357.
- [6] H. Foysi, S. Sarkar and R. Friedrich. Compressibility effects and turbulence scalings in supersonic channel flow. *Journal of Fluid Mechanics*, Vol. 509, 2004, pp. 207-216
- [7] S. Heinz and H. Foysi. Supersonic channel flow: The effect of compressibility in turbulence models. – In: *Advances in Turbulence X, Proc. of the 10th European Turbulence Conference*, CIMNE Verlag, 2004, pp. 685-688.
- [8] H. Foysi and R. Friedrich. DNS of passive scalar transport in turbulent supersonic channel flow. – In: *High Performance Computing in Science and Engineering, Munich 2004*, Springer Verlag, S. Wagner et al. (Eds.), 2005, pp. 107-118
- [9] H. Foysi. Transport passiver Skalare in wandgebundener und isotroper kompressibler Turbulenz. Doktorarbeit, Lehrstuhl für Fluidmechanik, TU München, 2005
- [10] H. Foysi and R. Friedrich. Passive scalar transport in turbulent supersonic channel flow. – In: *Progress in Turbulence, Springer Proceedings in Physics*, Vol. 101, 2005, pp. 223-227.
- [11] H. Foysi, S. Sarkar and R. Friedrich. On the microstructure of the scalar field in compressible forced isotropic turbulence and supersonic channel flow. – In: Proc. of the 4th Turbulence and Shear Flow Phenomena Conference, Williamsburg, USA, 2005.
- [12] S. Heinz, H. Foysi and R. Friedrich. A  $(k,\omega)$ -analysis of turbulent supersonic channel flow DNS data. – In: Proc. of the 4th Turbulence and Shear Flow Phenomena Conference, Williamsburg, USA, 2005.
- [13] J. Mathew, H. Foysi and R. Friedrich. A new approach to LES based on explicit filtering. – In: Proc. of the 4th Turbulence and Shear Flow Phenomena Conference, Williamsburg, USA, 2005.
- [14] R. Friedrich, H. Foysi and J. Sesterhenn. Turbulent momentum and passive scalar transport in supersonic channel flow. – *J. Brazilian Soc. of Mech. Sciences & Eng.*, Vol. 28(2), 2006.
- [15] J. Mathew, H. Foysi and R. Friedrich. LES of compressible flows via explicit filtering. – *Int. J. of Heat & Fluid Flow*, Vol. 27, Issue 4, pp. 594-602, 2006

- [16] I. Mahle, R. Friedrich, H. Foysi and S. Sarkar. Effects of heat release on the turbulence structure in temporally evolving compressible mixing layers. - Proceedings of the TSFP5, 2007
- [17] I. Mahle, H. Foysi, S. Sarkar & R. Friedrich. On the turbulence structure in inert and reacting compressible mixing layers. - Journal of Fluid Mechanics, Vol. 593, pp. 171-180, 2007
- [18] H. Foysi, J.P. Mellado, S. Sarkar. Simulation and Comparison of Variable Density Round and Plane Jets - In: Proc. of the 6th Turbulence and Shear Flow Phenomena Conference, Seoul, Korea, 2009
- [19] S. Gosh, H. Foysi, R. Friedrich. Compressible Turbulent Channel and Pipe Flow: Similarities and Differences. - In: Proc. of the 6th Turbulence and Shear Flow Phenomena Conference, Seoul, Korea, 2009
- [20] H. Foysi, S. Sarkar. The compressible mixing layer: an LES study. - Theoretical and Computational Fluid Dynamics, Vol. 24(6), 565- , 2010
- [21] H. Foysi, M. Mellado, S. Sarkar. Simulation and Comparison of Variable Density Round and Plane Jets. - International Journal of Heat & Fluid Flow, Vol. 31, pp. 307-314, 2010
- [22] S. Gosh, H. Foysi, R. Friedrich. Compressible Turbulent Channel and Pipe Flow: Similarities and Differences. - Journal of Fluid Mechanics, Vol. 648, pp. 155-181, 2010
- [23] G. Geiser, S. Koh, H. Foysi, W. Schröder. Sound generation of variable density jets. AIAA-2010-3844, 16th AIA/CEAS Aeroacoustics Conference, Stockholm, Sweden, 2010
- [24] H. Foysi, G. Geiser, S. Koh, W. Schröder. Effect of filter width on jet aeroacoustics. AIAA-2010-3845, 16th AIA/CEAS Aeroacoustics Conference, Stockholm, Sweden, 2010
- [25] G. Geiser, H. Foysi, W. Schröder, M. Meinke. On Sound Generated by a Globally Unstable Round Jet. - In: High Performance Computing on Vector Systems 2010, Part 4, pp. 123-136, Springer Verlag, 2010
- [26] C. Schaupp, R. Friedrich, H. Foysi. Transverse injection of plane reacting jet into compressible turbulent channel flow. In. Proc. of the 7th Turbulence and Shear Flow Phenomena Conference, Ottawa, Canada, 2011
- [27] S.R. Koh, G. Geiser, H. Foysi, W. Schröder. Impact of Inhomogeneous Density Distribution on Acoustic Sources in Turbulent Jets. - In: ERCOFTAC Bulletin March 2012, pp. 15-21, Printed by CZSTOCHOWA UNIVERSITY OF TECHNOLOGY, 2012
- [28] C. Schaupp, R. Friedrich, H. Foysi, Transverse injection of a plane reacting jet into compressible turbulent channel flow. - Journal of Turbulence, Vol. 13, No. 24, pp. 1-40, 2012
- [29] D. Marinc and H. Foysi. Investigation of a continuous adjoint-based optimization procedure for aeroacoustic control of plane jets. Int. J. Heat and Fluid Flow, Vol. 38, pp. 200-212, 2012
- [30] G. Geiser, S.R. Koh, H. Foysi. Sound generation of variable density jets. Proceedings-Institute of Aerodynamics, RWTH Aachen University, Heft 35, 2012
- [31] D. Marinc and H. Foysi. Optimal control of a plane jet using the adjoint method. New Results in Numerical and Experimental Fluid Mechanics VIII, Notes on Numerical Fluid Mechanics and Multidisciplinary Design, Editors: Dillmann, A., Heller, G., Kreplin, H.P., Nitsche, W., Peltzer, I., Springer Verlag, Volume 121, pp 151-159, 2013
- [32] D. Marinc, H. Foysi. Comparison of Gradient Accuracy and Noise Minimization using Continuous and Discrete Adjoint Method for a Subsonic Planet Jet., Submitted to J. Comput. Physics, 2013

- [33] G. Chagelishvili, G. Khujadze, H. Foysi and M. Oberlack, "Spanwise reflection symmetry breaking and turbulence control: Plane Couette flow", *Journal of Fluid Mechanics*, 745 , p. 300, 2014;
- [35] Bernd Engel, Evelyne Soemer, Holger Foysi and Fettah Aldudak, "Investigation of fibre movement in molten polymer during shaping processes of thermoplastic composites." *Key Engineering Materials* Vols. 611-612 (2014) pp 375-381
- [36] Michael Frewer, George Khujadze, Holger Foysi, A critical examination of the statistical symmetries admitted by the Lundgren-Monin-Novikov hierarchy of unconfined turbulence arXiv:1412.6949 (2014)
- [37] Michael Frewer, George Khujadze, Holger Foysi, Is the log-law a first principle result from Lie-group invariance analysis? arXiv:1412.3069 (2014)
- [38] Michael Frewer, George Khujadze, Holger Foysi, On the physical inconsistency of a new statistical scaling symmetry in incompressible Navier-Stokes turbulence, [arXiv:1412.3061](https://arxiv.org/abs/1412.3061), (2014)
- [39] Vigdorovich I., Foysi H. Simultaneous Invariants of Strain and Rotation Rate Tensors and Their Admitted Region, *Advances in Mathematical Physics*, Article ID 147125 Volume 2015 (2015)
- [40] Vigdorovich I., Foysi H. Admitted region for simultaneous invariants of strain and rotation rate tensors. *Fluid Dynamics*, 2016
- [41] M. Frewer, G. Khujadze, and H. Foysi. Comment on "Statistical symmetries of the Lundgren-Monin-Novikov hierarchy", *Accepted* for publication in *Physical Review E* (2016)
- [42] M. Frewer, G. Khujadze, and H. Foysi. "Comment on "Application of the extended Lie group analysis to the Hopf functional formulation of the Burgers equation" [*J. Math. Phys.* 54, 072901 (2013)]" *Accepted* for publication in *J. Mathematical Physics*, 2015
- [43] Küllmer K, Krämer A, Reith D, Joppich W, Foysi H, Numerical Optimization of the Pseudopotential-based Lattice Boltzmann Method, submitted to *J. Comput. science*, 2016
- [44] Krämer A, Küllmer K, Wilde D, Reith D, Joppich W, Foysi H, A comparative study of Lattice Boltzmann methods on structured and unstructured grids, submitted to *J. Comput. science*, 2016
- [45] Mamatsashvili G, Dong S, Khujadze G, Chagelishvili G, Jimenez J and Foysi H, Homogeneous shear turbulence - bypass concept via interplay of linear transient growth and nonlinear transverse cascade. Submitted to *Phys. Fluids*, 2015