

# Publications

## Thesis

- [1] M. Klein. *Towards LES as an Engineering Tool*, Habilitation, Technische Universität Darmstadt. 2009.
- [2] M. Klein. *Direkte Numerische Simulation des primären Strahlzerfalls in Einstoffzerstäuberdüsen*. PhD thesis, Technische Universität Darmstadt, 2002.

## Journal Articles

- [3] J. Hasslberger, S. Marten, and M. Klein. A theoretical investigation of flow topologies in bubble- and droplet-affected flows. *Fluids*, 2019, accepted.
- [4] W. Sayed, M. Klein, S. Izawa, and Y. Fukunishi. A hyperbolic partial differential equation model for filtering turbulent flows. *Computers and Fluids*, 2019, accepted.
- [5] G. Ozel Erol, J. Hasslberger, M. Klein, and N. Chakraborty. Propagation of spherically expanding turbulent flames into fuel droplet-mists. *Flow Turbulence and Combustion*, 2019, accepted.
- [6] S. Ketterl, M. Reissmann, and M. Klein. Towards large eddy simulation of multiphase flow using the volume of fluid method: Part 2 - a-posteriori analysis of liquid jet atomization. *Experimental and Computational Multiphase Flow*, 2019, accepted.
- [7] M. Klein, S. Ketterl, and J. Hasslberger. Towards large eddy simulation of multiphase flows using the volume of fluid method: Part 1 - governing equations and a-priori analysis. *Experimental and Computational Multiphase Flow*, 2019, accepted.
- [8] M. Klein, C. Kasten, and M. Germano. Decomposition of turbulent fluxes from filtered data and application to turbulent premixed combustion modelling. *Flow Turbulence and Combustion*, 2019, accepted.
- [9] A. Alqallaf, M. Klein, C. Dopazo, and N. Chakraborty. Evolution of flame curvature in turbulent premixed bunsen flames at different pressure levels. *Flow Turbulence and Combustion*, 2019, accepted.
- [10] U. Ahmed, N. Chakraborty, and M. Klein. On the stress-strain alignment in premixed turbulent flames. *Scientific Reports*, 2019, accepted.
- [11] U. Ahmed, N. Chakraborty, and M. Klein. Insights into the bending effect in premixed turbulent combustion using the flame surface density transport. *Combustion Science and Technology*, 2019, accepted.
- [12] G. Ozel Erol, J. Hasslberger, M. Klein, and N. Chakraborty. A direct numerical simulation investigation of spherically expanding flames propagating in fuel droplet-mists for different droplet diameters and overall equivalence ratios. *Combustion Science and Technology*, 2019, accepted.
- [13] A. Alqallaf, M. Klein, and N. Chakraborty. Effects of lewis number on the evolution of curvature in spherically expanding turbulent premixed flames. *Fluids*, 4(1):4010012, 2019.
- [14] M. Klein and M. Germano. On the decomposition of the Reynolds stress from filtered data. *Physical Review Fluids*, 3:114606, 2018.

- [15] N. Chakraborty, V. Papapostolou, D. H. Wacks, M. Klein, and H. G. Im. Generalised flame surface density transport conditional on flow topologies for turbulent h<sub>2</sub>-air premixed flames in different regimes of combustion. *Numerical heat transfer*, 74:1353–1367, 2018.
- [16] J. Hasslberger, S. Ketterl, M. Klein, and Nilanjan Chakraborty. Flow topologies in primary atomization of liquid jets: A direct numerical simulation analysis. *Journal of Fluid Mechanics*, 859:819–838, 2018.
- [17] V. Papapostolou, N. Chakraborty, M. Klein, and H. G. Im. Statistics of scalar flux transport of major species in different premixed turbulent combustion regimes for H<sub>2</sub>-air flames. *Flow Turbulence and Combustion*, 2018, accepted.
- [18] K. Amend and M. Klein. Development and validation of a CFD wash-off model for fission products on containment walls. *International Journal for Nuclear Power*, 63:469–473, 2018.
- [19] U. Ahmed, N. Doan, J. Lai, M. Klein, N. Chakraborty, and N. Swaminathan. Multiscale analysis of head-on quenching premixed turbulent flames. *Physics of Fluids*, 30:105102 1–13, 2018.
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## Conferences

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- [139] Eike Tangermann, Markus Klein, and Michael Pfitzner. Large eddy simulation of flame flashback by combustion induced vortex breakdown. In *9th International Symposium on Turbulence and Shear Flow*, Melbourne, Australia, July 2015.
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- [141] M. Klein, N. Chakraborty, Y. Gao, C. Kasten, and M. Pfitzner. Analysis of the combined modelling of subgrid transport and filtered flame propagation for premixed turbulent combustion. In *9th Mediterranean Combustion Symposium*, Rhodes, Greece, June 2015.
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- [174] D. Goryntsev, O. Stein, M. Klein, and J. Janicka. Charakterisierung zyklischer Schwankungen der Brennrauminnenströmung eines direkteinspritzenden Ottomotors mittels der Grobstruktursimulation. In *VII. Tagung Motorische Verbrennung*, März 2005.
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- [178] M. Klein, A. Kempf, A. Sadiki, and J. Janicka. Mixing analysis of a plane jet using direct numerical simulation. In *Euromech 10th European Turbulence Conference*, Trondheim, Norway, July 2004.
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## Invited Talks

- [192] M. Klein. Towards LES of primary atomization. In *International Workshop on Clean Combustion: Principles and Applications*, Darmstadt, September 2019.
- [193] M. Klein. Towards LES of multiphase flows with moving interfaces. University of Groningen, July 2019.
- [194] M. Klein. Towards LES of multiphase flows with moving interfaces. Darmstadt, May 2019.
- [195] M. Klein. Towards LES of multiphase flows with moving interfaces. In *16th Multiphase Flow Conference and Short Course*, Dresden, November 2018.
- [196] M. Klein. Mathematische und physikalische Modellierung von turbulenten Zweiphasenströmungen. ITLR, University Stuttgart, March 2018.
- [197] M. Klein. Towards LES for two phase flows. Helmholtz-Zentrum Dresden-Rossendorf, July 2017.
- [198] M. Klein. Recent experiences with modelling of turbulence chemistry interaction in the context of LES using DNS of turbulent premixed generic planar flame configurations. Annual meeting of the UK Consortium on Turbulent Reacting Flows, September 2016.
- [199] M. Klein. Analysis of the combined modelling of subgrid transport and filtered flame propagation for premixed turbulent combustion. University of Duisburg, January 2015.
- [200] M. Klein. An attempt to assess the quality of les in the context of implicit filtering. University of Newcastle, November 2013.
- [201] M. Klein. Industrial CFD: Applications and challenges. Technical University of Munich, February 2013.
- [202] M. Klein. 3D CFD base engine development. University of Applied Science, Darmstadt, December 2010.
- [203] M. Klein. 3D CFD base engine development. University of Applied Science, Darmstadt, December 2009.
- [204] M. Klein. 3D CFD base engine development. University of Applied Science, Darmstadt, January 2008.
- [205] M. Klein. LES quality assessment. In *8th Workshop on Turbulent Nonpremixed Flames*, Heidelberg, August 2006.
- [206] M. Klein. Quality assessment of LES in the context of implicit filtering. In *Quality Assessment of Unsteady Methods for Turbulent Combustion Prediction and Validation*, Darmstadt, June 2005.
- [207] M. Klein. Numerical and experimental characterization of the turbulence structure in swirled flows. Cambridge University, November 2004.
- [208] M. Klein. How LES can be made an engineering tool. Cambridge University, July 2004.
- [209] M. Klein. Direkte numerische Simulation von ebenen ein- und zweiphasigen Freistrahlen. University of Zurich, Mai 2003.
- [210] M. Klein. On the artificial generation of inlet and initial data for unsteady turbulent flow simulation. In *17. TECFLAM-Seminar*, Stuttgart, Dezember 2003.