Programm des 22. STAB-Workshops 2025

10. – 12. November 2025

Deutsches Zentrum für Luft- und Raumfahrt, Bunsenstraße 10, 37073 Göttingen

mit Sonder-Veranstaltung

„100 Years of Ludwig Prandtl's Mixing Length Model"

DGLR

STAB

100 Years of Ludwig Prandtl's Mixing Length Model

Special Session on Turbulence Modeling (as part of the STAB-Workshop 2025)

10 November 2025 - DLR Göttingen (in cooperation between DLR and STAB)
Hans-Georg-Küssner-Raum, Building 26.3, Room 030A

Agenda

ab/from 13:15: *Registrierung/Registration*

14.00 – 14.05: *Introductory words* – Andreas Dillmann (DLR)

14.05 – 14.40: *100 Years Later - Status of Turbulence Modeling for Boundary Layers in Industrial CFD Simulations*
Florian Menter (Ansys GmbH)

14.40 – 15.15: *Sensitizing turbulence-transport models to flow transients: physical rationale and applications*
Suad Jakirlic (TU Darmstadt)

15.15 – 15.50: *RANS Turbulence Modeling for Aerospace Applications. Development, Validation and Prospects*
Tobias Knopp (DLR)

15.50 – 16.25: *From Mixing-Length to Transformers: current status and challenges in data-driven turbulence modeling*
Paola Cinnella (Sorbonne Université)

COFFEE BREAK

16.45 – 17.15: Panel discussion

17.15 – 17.50: *Ludwig Prandtl and the Turbulence* - Eberhard Bodenschatz (MPI-DS)

17.50 – 18.15: *The Resilience of Prandtl's Mixing-Length Hypothesis* - George Huang (Wright State University)

18.15 – 18.30: Closing remarks

COME TOGETHER: TRADITIONAL DINNER "EINTOPF UND BIER"(SOUP AND BEER) IN THE DLR CANTEEN

Dienstag, 11. November 2025

Raum	School_Lab (Haus 6, Raum 092)	Adolf-Busemann-Raum (Haus 7, Raum 015)	Hubert-Ludwieg-Raum (Haus 11, EG)
	S01: Turbulenz und Transition Chair: T. Knopp	**S02: Numerische Aerodynamik** Chair: C. Grabe	**S03: Multidisziplinäre Optimierung** Chair: C. Rossow
9:00- 9:20 Uhr	*Progress with verification and stabilization of Reynolds stress models using the CFD Software by ONERA, DLR, Airbus (CODA)* K. Chandrasekar Jeyanthi, T. Knopp, J. Löwe, M. Werner (DLR)	*Multidisciplinary Higher-Order Time Integration Towards Adaptive Time-Stepping* I. Shuvi, F. Roß, A. Stück (DLR)	*Aeroshape Optimization of a UAV configuration for Mars exploration* G. Barbato, C. Amato, T. Horchler, T. Ecker (Università degli Studi della Campania, Luigi Vanvitelli)
9:20 - 9:40 Uhr	*Outer-layer self-similarity in spatially developing turbulent boundary layers* J. Appelbaum, T. Gibis, S. Pirozzoli, C. Wenzel (Universität Stuttgart)	*A Hybrid Differentiation Approach towards Performance-Improved Discrete Adjoint CFD Computations* B. Sert, A. Büchner, F. Kasielke, A. Schmid, A. Stück (DLR)	*Variational Flow-State Estimation and Sensor Placement Optimization from Discrete Measurements* M. Lemke, V. Citro (TU Berlin)
9:40 - 10:00 Uhr	*The occurrence of turbulent spots during free flight in the convective atmosphere* U. Deck (Universität Stuttgart)	*Impact of Spectral Element Polynomial Order on Large-Eddy Simulations of a Thick Flatback-Airfoil* T. Thomas, J. Theron, N. Manelil, B. Stoevesandt, P. Schlatter (Fraunhofer IWES)	*Improvements on Robust High-Fidelity Dataset-Based Optimization for Aircraft Design* M. Maier, K. Sørensen-Libik, C. Breitsamter (TU München)
10:00 - 10:20 Uhr	*Kinetic Energy Budget of Secondary Motions in Sinusoidally-tempered Vertical Turbulent Pipe Flow* F. Finke, C. Bauer, C. Wagner (DLR)	*Impact of the entropy fix at viscous wall boundaries* J. Sánchez Gil, M. Fertig, R. Hartmann, T. Knopp, S. Langer, T. Leicht, A. Schwöppe (DLR)	*An MDAO-Framework Approach enabling Adjoint Sensitivity Analyses in Unsteady Multidisciplinary Problems* F. Roß, S. Gottfried, A. Stück (DLR)

10:20 - 11:00 Uhr	Kaffeepause in der Kantine

Dienstag, 11. November 2025

Raum	School_Lab (Haus 6, Raum 092)	Adolf-Busemann-Raum (Haus 7, Raum 015)	Hubert-Ludwieg-Raum (Haus 11, EG)
	S04: Turbulenz und Transition Chair: C. Bauer	**S05: Strömungsbeeinflussung** Chair: A. Büscher	**S06: Allgemeine Strömungstechnik** Chair: P. Bahavar
11:00 - 11:20 Uhr	*Recent advances of hybrid RANS/LES with Reynolds-stress background modelling* Marius Herr, P. Grotowsky, A. Probst (DLR)	*Onset of Turbulence in Particle-laden Pulsatile Pipe Flow Experiments with a Physiological Waveform* L. Richter, K. Avila, B. Bäuerlein (Universität Oldenburg)	*Towards a Fully-Coupled Incompressible Two-Phase Flow Solver* D. Kunhappan, M. Ertl (DLR)
11:20 - 11:40 Uhr	*Stability Analysis for JAXA-Supersonic NLF Wing NEXST-1* Y. Ide (DLR)	*Bayesian minimisation of energy consumption in turbulent pipe flow via unsteady driving* F. Kranz, D. Morón, M. Avila (Universität Bremen)	*Applying event-based imaging to reconstruct large-scale flow features* S. Brückner, M. Hilfer, D. Rival (TU Braunschweig)
11:40 - 12:00 Uhr	*The law of the wall: A phenomenological discussion for a leading order reconstruction of the mean velocity profile in fully developed turbulent channel and pipe flows* J. Medina Méndez, H. Schmidt (BTU Cottbus-Senftenberg)	*Numerical analysis of surface jets for load alleviation on transport aircraft* F. Siebert, T. Strotheicher, A. Bauknecht (TU Braunschweig)	*PTV MEASUREMENT NEAR A PASSENGER MODEL INSIDE THE CABIN OF A SHORT-HAUL AIRCRAFT* A. Gluschak, R. Barta, C. Wagner (DLR)

12:00 - 14:00 Uhr	Mittagspause
12:10 - 13:50 Uhr	**STAB-Sitzung (Progammleitung/Fachgruppensprecher/innen), Albert-Betz-Raum, Haus 9, 1.OG, über der Kantine**

Dienstag, 11. November 2025

14:00 - 14:45 Uhr School_Lab Haus 6, Raum 092	**Plenarvortrag** ***Titel:*** *"4+ Decades of experience with Prandtl's Mixing Length"* Mike Olsen

Raum	**School_Lab (Haus 6, Raum 092)**	**Adolf-Busemann-Raum (Haus 7, Raum 015)**	**Hubert-Ludwieg-Raum (Haus 11, EG)**
	S07: Tubulenz und Transition Chair: T. Lutz	**S08: Experimentelle Aerodynamik** Chair: C. Breitsamter	**S09: Drehflügler + Windenergie** Chair: T. Gardner
15:00 - 15:20 Uhr	*Study of the compressible mixing-layer correction for the SST k-ω model and for the SSG/LRR-ω model and application to the simulation of plumes* T. Knopp, R. Höld (DLR)	*Searching for the gust-wing interaction textbook* R. Olivucci, D. Rival (TU Braunschweig)	*Sound Directivity Measurement at The WiValdi Research Wind Park* S. Suryadi, P. Seelemyer, H. Bucholz, M. Pott-Pollenske, S. Lin, Michaela Herr (DLR)
15:20 - 15:40 Uhr	*Experimental investigation and data-driven turbulence modeling for flow separation and reattachment* C. Grabe, T. Knopp, A. De Vincenzo, R. Geisler, M. Costantini, D. Schanz, A. Schröder (DLR)	*Characterization of a phosphor-based temperature-sensitive paint for high-temperature applications* F. Rosner, C. Klein, B. Dimond, P. Nau, S. Surujhlal, T. Jüstel (DLR)	*Modal Analysis of Volumetric Flow Fields around a Quadcopter from Experimental Shake-The-Box Results* A. Fenk, C. Wolf, G. Thäter (DLR)
15:40 - 16:00 Uhr	*A Functional Large Eddy Model Rooted in URANS* M. Olsen	*Anemometers in Wind Tunnels –Analysis of Flow-Induced Measuring Errors* W. Send (ANIPROP GbR)	*Wind Tunnel Experiments on Rotor Blade Tip Vortices using Hot-Film Anemometry* L. Mezzoli, H. Bartzsch, A. Zanotti, C. Wolf, M. Raffel (DLR)
16:00 - 16:20 Uhr	*A (very) poor man's approach to turbulence modeling* C. Rossow (ehemals DLR)	*Investigation of ice formation on unmanned aerial vehicles at low Reynolds numbers* K. Soy, M. Gallia (TU Braunschweig)	*Out of Ground Effect Blade Tip Vortex Study of a Single Bladed Rotor in Hover* M. Neef, A. Heintz, H. Bartzsch, C. Schwarz, C. Wolf, M. Raffel (DLR)
16:20 - 16:40 Uhr	*New Insight into Material Transport in a Turbulent Boundary Layer based on Lagrangian Areas of Minimal Stretching (LAMS)* U. Rist, M. Weinschenk, C. Wenzel (Universität Stuttgart)	*Optical deformation measurement for load monitoring on a scaled flight test vehicle* J. Wagner, T. Kirmse, O. Luderer, F. Thielecke, W. Gropengießer, S. Adden (DLR)	*Test Stand for Measurements on Lateral Stability of Rotorcraft in Ground Effect* J. Schwalbe, F. Schreiner, A. Gardner, C. Wolf, H. Barzsch, A. Heintz, J. Braukmann (DLR)

Mittwoch, 12. November 2025

Raum	School_Lab (Haus 6, Raum 092)	Adolf-Busemann-Raum (Haus 7, Raum 015)	Hubert-Ludwieg-Raum (Haus 11, EG)
	S10: Aerodynamik bodengebundener Fahrzeuge Chair: A. Wäschle	**S11: Numerische Aerodynamik + Transportflugzeugkonfigurationen** Chair: A. Probst	**S12: Experimentelle Aerodynamik + Transportflugzeugkonfigurationen** Chair: C. Breitsamter
9:00 - 9:20 Uhr	~~*Application of Pressure-Sensitive Paint for Unsteady Rim Pressure Measurements on a Passenger Car*~~ ~~A. Peterka, K. Ehrenfried~~ ~~(DLR)~~	*Aerodynamic Design of an HLFC Wing for a Long-range Transport Aircraft* D. San, S. Kakkar, M. Hillebrandt, A. Bauknecht, T. Lutz (TU Braunschweig)	*Exploring Lagrangian flow-separation criteria using back-illuminated Temperature Sensitive Paint (TSP) and Lagrangian Particle Tracking (LPT)* M. Hilfer, R. Braun, D. Rival (TU Braunschweig)
9:20 - 9:40 Uhr	*Investigating extreme crosswind-stability of vehicles on bridges: applying a movingmodel and side wind-tunnel methodology with full-scale validation* J. Bell, I. Tolo, J. Snæbjörnsson, J. Jakobsen (DLR)	*A High-Order Galerkin-Type 3D Panel Method – Current Status and Perspective* K. Bock (DLR)	*Experimental Study of Turbulent Boundary Layer Separation Induced by a BackwardFacing Ramp* M. Costantini, C. Klein, A. De Vincenzo, R. Geisler, J. Lemarechal, D. Schanz, A. Schröder, T. Knopp, C. Grabe, S. Sattler, M. Miozzi (DLR)
9:40 - 10:00 Uhr	*Application of Pressure-Sensitive Paint for Unsteady Rim Pressure Measurements on a Passenger Car* J. Hübner, S. Lange, M. Hähnel, M. Hilfer (Volkswagen AG)	*Towards rapid flow reconstruction using surface observations: Exploring data assimilation strategies on a toy problem* A. González Villatoro, M. Gallia, D. Rival (TU Braunschweig)	*Parametric investigation of the flow-physical effects of Boxwing-Configurations in combination with Distributed Electric Propulsion in cruise and STOL conditions* A. Gothow, T. Grund, J. Weiss (TU Berlin)
10:00 - 10:20 Uhr	*Investigation of the Tunnel Passage of Coupled Trains* K. Ehrenfried, D. Heine (DLR)	*VERIFICATION AND EFFICIENCY STUDY USING THE TIME-SPECTRAL METHOD (TSM) FOR FAST PREDICTIONS OF GUST ENCOUNTER IN VISCOUS FLOW* R. Haupt, C. Kaiser, A. Stück (DLR)	*Experimental Investigation of Aerodynamic Effects in Wing Coupling* A. Kolberg, T. Grund, J. Weiss (TU Berlin)

10:20 - 11:00 Uhr	Kaffeepause in der Kantine

Mittwoch, 12. November 2025

Raum	School_Lab (Haus 6, Raum 092)	Adolf-Busemann-Raum (Haus 7, Raum 015)	Hubert-Ludwieg-Raum (Haus 11, EG)
	S13: Bio- und Mikrofluidmechanik Chair: L. Krenkel	**S14: Allgemeine Strömungstechnik** Chair: P. Bahavar	**S15: Strömungsbeeinflussung** Chair: A. Büscher
11:00 - 11:20 Uhr	*Experimental Investigation of Shear-Induced Generation of Respiratory Aerosol: Simultaneous Measurements of Particle Quantities and Wave Topology* <u>J. Michel</u>, L. Krenkel (OTH Regensburg)	*Large-eddy simulation of wind loads on photovoltaic systems: Comparative opensource CFD study with outlook on urban and aerothermal aspects* <u>M. Klein</u>, H. Kotra, M. Kabongo, J. Gerardi, H. Schmidt (BTU Cottbus-Senftenberg)	*LES/URANS of heat transfer enhancement due to Kelvin-Helmholtz instability on finned channel* <u>D. Sotomayor-Zakharov</u>, P. Scholz (TU Braunschweig)
11:20 - 11:40 Uhr	*Parametrical Investigation of the Aerodynamics of Maple Seeds in Controlled Autorotation Condition in a Vertical Wind Tunnel* <u>K. Neumeier</u>, F. Erzinger, L. Krenkel (OTH Regensburg)	*Aerosol particle transport through an air curtain: Influence of particle Stokes number and jet Reynolds number* <u>A. Kohl</u>, D. Schmeling, C. Wagner (DLR)	*DNW-NWB Wind Tunnel Experiments for Efficient Sequential Suction* <u>H. Lüdeke</u>, R. von Soldenhoff (DLR)
11:40 - 12:00 Uhr	*ML-assisted analysis of flow patterns in artificial membrane lungs* <u>D. Pointner,</u> L. Krenkel (OTH Regensburg)	*Predictions of Exhalation-Induced Particle Dispersion with the Improved Particle Dispersion Models* <u>E. Batmaz</u>, D. Schmeling, C. Wagner (DLR)	*Influence of Discrete Suction Orifices on Effectiveness of HLFC Surfaces* <u>R. von Soldenhoff</u>, H. Lüdeke (DLR)

12:00 - 13:30 Uhr	Mittagspause

Mittwoch, 12. November 2025

Raum	School_Lab (Haus 6, Raum 092)	Adolf-Busemann-Raum (Haus 7, Raum 015)	Hubert-Ludwieg-Raum (Haus 11, EG)
	S16: Turbulenz und Transition Chair: U. Rist	**S17: Hyperschallaerothermodynamik** Chair: M. Konopka/B. Reimann	**S18: Hochagile Konfigurationen** Chair: R. Höld
13:30 - 13:50 Uhr	*Experiments on the combined influence of free-stream turbulence and roughness element on boundary layer transition* T. Römer, M. Kloker, U. Rist, C. Wenzel (Universität Stuttgart)	*Investigation of the ablation of fins in hypersonic flows* L. Barbiche, F. Denis, S. Sauerwein, M. Bastide, A. Runser, R. Kempf (French-German Research Institute of Saint-Louis, ISL)	*From Gaussian Process Regression to Bayesian Neural Networks: Uncertainty Quantification for High-Dimensional Aerodynamic Datasets* F. Dunkes, H. Steiner, C. Breitsamter (TU München)
13:50 - 14:10 Uhr	*Experiences and Lessons Learned using the FI/ML Approach for Data-driven Turbulence Modeling* M. Semercioglu (DLR)	*Boundary-layer investigation of the MORABA sounding research rocket at hypersonic speeds* L. Bott, C. Stemmer (TU München)	*Sabot separation of a group of finned slender projectiles in Mach 4.5 flow.* O. Grudziński, R. Hruschka, M. Bastide, B. Sauerwein, R. Kempf, C. Stemmer (French-German Research Institute of Saint-Louis, ISL)
14:10 - 14:30 Uhr	*Numerical Study of Compressible Turbulent Asymptotic Suction Boundary Layers* A. Suntharарajan. S. Cifuentes Waidelich, T. Gibis, C. Wenzel (Universität Stuttgart)	*Influence of wall temperature distribution on hypersonic flow stability* C. Capecchi, C. Stemmer (TU München)	*Semi-Empirical and Numerical Analysis of the Aerothermal Heating of a Hypersonic Sounding Rocket* S. Michalski, F. Lamnek Diehl Defence GmbH & Co KG
14:30- 14:50 Uhr	*Effects of scalene triangular transverse bars on the structure of turbulent channel flow* O. Zhdanov, A. Busse (TU Berlin)	*Electron density measurement in a high-enthalpy shock tunnel at Mach 10* N. Courvalin, F. Denis, C. Rey, B. Sauerwein, M. Bastide, R. Kempf, A. Runser (French-German Research Institute of Saint-Louis, ISL)	*Numerical Investigations on Vortex-Vortex and Vortex-Shock Interactions at Hybrid-Delta-Wing Configurations* Y. Özdemir, C. Breitsamter (TU München)
14:50 - 15: 10 Uhr	*Applic ation of the DLR ɣ Transition Transport Model in the CFD Software by ONERA, DLR and Airbus (CODA) for Aeronautical Industrially Relevant Flows* V. Togiti (DLR)	*Flow Field Analysis of a Blended-Wing-Body Re-entry Vehicle in Different Speed Regimes* S. Giannino, C. Amato, T. Hocheler, T. Ecker (Università degli Studi della Campania, Luigi Vanvitelli)	*Pitch Recovery Investigations on a Generic Fighter Aircraft Configuration* A. Schütte, A. Puttur (DLR)