Study projects, Bachelor and Master Theses

We specialize in fundamental research using stochastic turbulence models.

Candidates can propose and discuss a broad range of topics of interest with the instructor. Suggested areas are:

1. **Modeling and simulation of highly turbulent flows:** turbulence modeling of isotropic turbulence, wall-bounded turbulent flows, free shear flows.

2. **Reactive flows and combustion:** detailed combustion chemistry in free shear flows, wall-bounded flows and closed systems.

3. **Electrohydrodynamics:** e.g. electrolytes, flow control, electrokinetic-turbulence interactions.

4. **Boundary-layer flows:** transient boundary layer dynamics.

5. **Heat and mass transfer:** forced, mixed, and free convection; turbulent thermal convection; transport of passive and active scalars.

6. **Aerosol generation and agglomeration:** e.g. in gas cleaning applications.

7. **Plasma-enhanced flows:** e.g., chemical kinetics in electrohydrodynamic flows (e.g. corona discharge) and effluent

8. **Transport and mixing:** e.g., turbulent jet flows, falling films, single and multi-phase flows.

Within our area of expertise, specific topics where the chair staff can already propose a detailed project outline are:

Topic	Contact person
Open topic	Any group member
Turbulent jets: from exhalation to jet engines	Heiko Schmidt
ODT-enhanced post-processing of RANS simulation results	Heiko Schmidt
Turbulent thermal convection with internal heat sources and sinks	Marten Klein
Transient dynamics in Ekman boundary layers	Marten Klein
Heat transfer and friction characterization in rotating pipe flows	Juan Medina
EHD-enhanced pipe-flows	Juan Medina
Heat and mass transfer in electrolyte fuel cells	Tommy Starick
Acoustic characterization of rough wall turbulent channel flows	Juan Medina & Sparsh Sharma

Possible tools to carry out the proposed investigations are OpenFOAM, ANSYS Fluent, Nek5000, or in-house CFD software.

Students intending to go for a topic listed above are strongly encouraged to successfully complete the module *CFD Project* and either *CFD 1* or *Turbulence Modeling*.

Further information can be found at the department website:
https://www.b-tu.de/fg-stroemungsmodellierung