HiWi / Bachelor / Master Thesis

Model Development for Premixed Nonequilibrium Turbulent Flame

With the advance of computational resources, Large Eddy Simulation (LES) becomes a promising method for the simulations of practical applications. In LES, large scales are resolved but small scales are modelled. Turbulence-flame interactions, which are important in turbulent premixed combustion, occur typically on small scales. Therefore, turbulent premixed flames are particularly difficult to describe in the context of LES. One widely used method is the G-equation method, where the flame fronts are explicitly tracked.

In this study we will investigate the G-Equation model in the context of LES. The LES models should be assessed in an a posteriori way, comparing with the already available DNS data. We will focus on the transition process from laminar to turbulent flame. A simplified configuration is chosen: a planar flame in isotropic turbulence. A planar laminar flame will be initialized in an isotropic turbulent flow field, where the laminar flame develops later into a turbulent flame. The combination with a HiWi-job is also possible.

Tasks

- LES simulation of the transition process from planar laminar flame to fully developed turbulent flame in CIAO
- Assessment of the premixed combustion models in LES
- Analysis of the influence of model parameters

Requirements

- Interest in programming
- Experience with Linux desirable
- Self-motivation & commitment

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