Simulation of turbulent mixing at high density ratio

Bachelor Thesis / Master Thesis / Studienarbeit / Diplomarbeit

Task description

Turbulent flows with strong temperature gradients are a challenging phenomenon in numerous engineering applications. For novel reactor concepts the non-uniformity of the power density distribution in the reactor core causes much larger gradients of the coolant temperature. This is stabilized by large density gradients, in particular for gas-cooled or supercritical water cooled reactors. Understanding and modeling of turbulent mixing in case of high density gradients and unsteady heat transfer in case of strong temperature fluctuations is of fundamental interest for engineering and design of novel nuclear reactors. This project is part of the large scale EU project THINS. In this project, the candidate will be responsible for further development and validation of the existing pseudo-transient CFD solver. The solver is implemented in the open source CFD toolbox OpenFOAM. The solver can significantly decrease computational time as compared to standard solutions and is of great interest for engineering simulations.
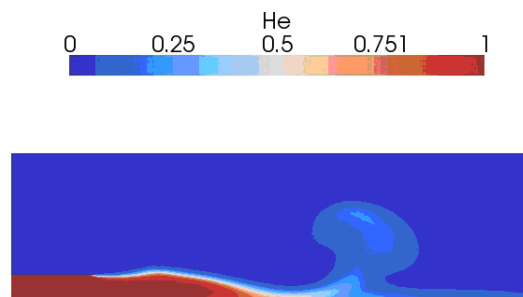

Abbildung 1: Helium-Air mixing in a square channel

Prerequisites

- Background in fluid dynamics and interest in modeling and CFD

- Experience with C++

- Good English skills

Start date

after consultation

Duration

3 - 6 months (depending of the scope of work)

Person in charge and contact

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