

Master/Bachelor Thesis

CFD Simulations of Natural Convection of Water in Rotating 2D Cavities

The study of free-natural convection in enclosures has been an area of interest in the thermofluid sciences for fundamental research and practical applications such as cooling of electronic equipment, fluid-filled thermal storage tanks and convection in building elements. The water density shows its maximum value at around 4°C. This feature makes the natural convection of water close to its maximum density non-trivial. This work will focus on the impact of rotational velocity, cavity aspect ratio and temperature conditions on the onset of natural convection and the corresponding flow and temperature distributions. The numerical simulations will be performed by means of the commercial software **Star-CCM+**.

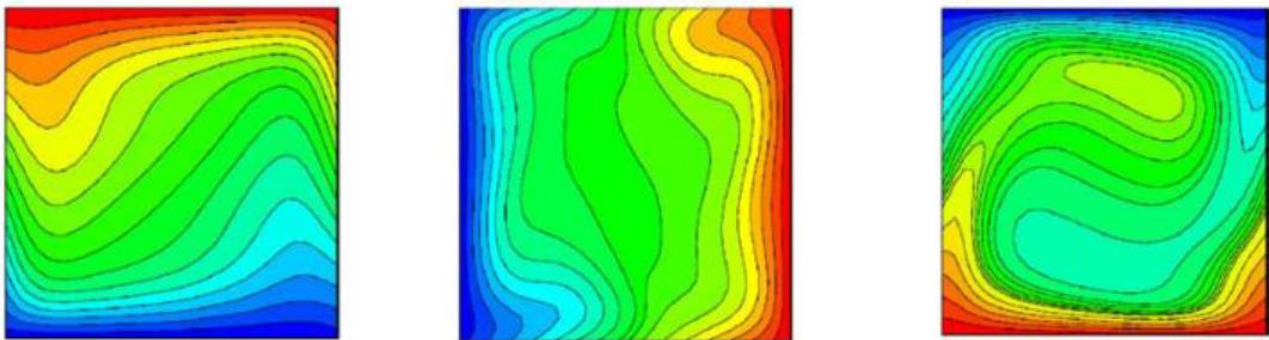


Figure 1: Isotherms in a rotating cavity heated and cooled at opposite walls

Tasks:

- Benchmark with experimental results from literature (solver validation)
- Setting simulation solver and boundary conditions
- Simulation of natural convection in 2D rotating cavities, varying characteristic parameters.
- Characterization of flow field, temperature distribution.
- Determination of critical parameters (critical Rayleigh number).

Your profile:

You study preferentially **CBI, CEN, MB** or **CE** and you cover some of the following aspects:

- You know about **Fluid mechanics** and **Thermodynamics**
- You already worked with **Computational Fluid Dynamics**
- You are able to **work independently** with your **own initiative**
- You are **motivated**

Starting: Immediately!!!!

Supervision:

Dr.-Ing. Anuhar Osorio Nesme

✉ anuhar.nesme@fau.de

Room: 1.261, ☎ 09131 / 85-29475

Lehrstuhl für Strömungsmechanik

Cauerstraße 4, 91058 Erlangen