

CFD WITH OPENSOURCE SOFTWARE

A COURSE AT CHALMERS UNIVERSITY OF TECHNOLOGY
TAUGHT BY HÅKAN NILSSON

Study questions and answers for:

Description of interCondensatingEvaporatingFoam and implementation of SGS term into volume fraction equation

Developed for OpenFOAM-v2112

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Disclaimer: This is a student project work, done as part of a course where OpenFOAM and some other OpenSource software are introduced to the students. Any reader should be aware that it might not be free of errors. Still, it might be useful for someone who would like learn some details similar to the ones presented in the report and in the accompanying files. The material has gone through a review process. The role of the reviewer is to go through the tutorial and make sure that it works, that it is possible to follow, and to some extent correct the writing. The reviewer has no responsibility for the contents.

January 17, 2023

Study questions

1. How does the phase interface be tracked in volume of fluid method?

Answer: The phase interface is represented by the fraction of liquid volume in each cell. If the liquid volume fraction in the cell equals to 0, the cell is filled with gas. If the liquid volume fraction in the cell equals to 1, the cell is filled with liquid. If the liquid volume fraction is somewhere in between, the cell is filled with the combination of both.

2. What is the assumption of the Lee's phase change model?

Answer: Lee's phase change model assumes that the mass is transferred at constant pressure and quasi-thermo-equilibrium state.

3. Why is the mass transfer rate \dot{m} decomposed into \dot{m}_v and \dot{m}_c

Answer: since the phase change between liquid and gas is condensation and evaporation. When the temperature is smaller than the saturated temperature, condensation happens. When the temperature is bigger than the saturated temperature, evaporation happens.

4. How do you implement source terms into the volume fraction equation in interFoam?

Answer: The first step could be create a H file and put the source term and the definition of the relevant variables into the file. Then, include the H file before the volume fraction equation. The last step is plus this term in the right hand side of the volume fraction equation.