International Conference on Finite Elements in Flow Problems - FEF 2017
5-7 April 2017, Rome, Italy
Flows with Moving Boundaries and Interfaces (MBI)

A particle-based method for the simulation of multi-phase flow problems

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Key words: Smoothed Particle Hydrodynamics, Weakly Compressible Flow, Incompressible Flow, Surface Tension, Interface Capturing

In multi-phase flow problems, the motion of the fluid interfaces and their correct capturing is a necessity and affects the quality of the achieved results massively. Lagrangian methods, like the Smoothed Particle Hydrodynamics method, have shown good capabilities of capturing these movements without the use of special capturing techniques beside the basic codes. In this talk we present predictive methods based on SPH for incompressible and weakly compressible flows regarding the representation of moving interfaces and surface tension. The approaches are of explicit nature for weakly compressible flows and semi-implicit nature for incompressible flows. Necessary treatments for the surfaces will be shown as much as the changes of the basic equations to make multi-phase flows possible.

The aim is to develop new mathematical models and interaction schemes that are related to the analysis of free surface multi-phase flow. Furthermore, new computational methods and software for robust and fast computations will be constructed in order to be able to solve demanding multi-phase flow situations.