Prof. Dr.-Ing. Heinz Pitsch

Templergraben 64
52056 Aachen
phone   +49 241 80 94607
fax   +49 241 80 92923
email   office@itv.rwth-aachen.de

itv **Institut für Technische Verbrennung**

RWTH AACHEN UNIVERSITY

Masterarbeit / HiWi

Development of a Non-Equilibrium-Based Multifluid Framework for Simulating Flash-Boiling Spray

Flash-boiling is one of the most effective ways to obtain high quality liquid atomization. It occurs when a liquid is injected into an environment where the local pressure is below the saturation pressure of the liquid. The non-equilibrium phase change in flash-boiling spray is mainly controlled by internal bubble nucleation, growth/collapse, and motion. Most of the current simulations use Homogeneous Relaxation Model (HRM) to incorporate the phase transition from liquid to vapor rather than considering the actual bubble dynamics. However, due to its semi-empirical nature, HRM severely lacks generality. Thus, in this work a non-equilibrium based multifluid model will be developed taking into account the effect of bubble dynamics to enable the accurate prediction of flash-boiling spray.
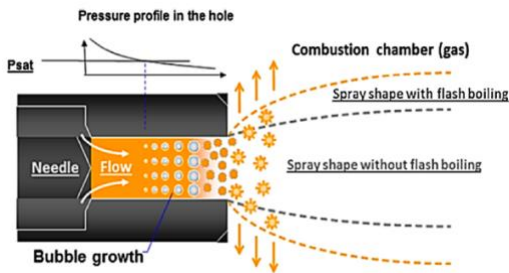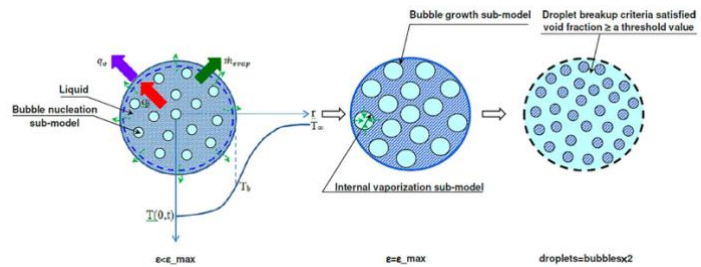

Fig 1. Schematic of flash boiling spray

Fig 2. Bubble nucleation, bubble growth and rupture

Tasks

- Extension of an in-house equilibrium based multifluid framework for flash-boiling spray
- Implementation of bubble dynamics models in the extended framework
- Validation of the results with the benchmark testcase
- Comparison of the multifluid results with LPT spray

Prerequisites/Requirements

- Programming knowledge, preferably Matlab
- Multiphase flow is desirable
- Fluent in English
- Ability to work independently
- Self-motivation and commitment

Contact

Avijit Saha
Tel.   +49 241 80 97592
a.saha@itv.rwth-aachen.de
www.itv.rwth-aachen.de

** There is a possibility to combine thesis work with HiWi