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Master thesis – numerical

Numerical simulation of flow boiling in a microchannel

Background

Study on flow boiling in a microchannel has been attracted by many researchers regarding to its critical application in a cooling system of high-speed processors and compact electronic devices. However, the behavior of flow boiling in the microchannel has not been yet well understood due to its complexities and instabilities. Therefore, we try to develop a reliable interfacial tracking algorithm for simulation of phase change of evaporation processes in microchannels.

Content of the Thesis

The present work focuses on heat transfer in a single, straight rectangular microchannel with flow boiling of deionized water. The investigation consists of a numerical component, in which two-phase thermal simulations are performed based on the two-phase VOF solver from OpenFOAM software package. Furthermore, microscale physics of phase change heat transfer should be studied theoretically for evaporation process in a microchannel. The goal of this work is to implement a custom multiphysics simulation scheme that acceptably reproduces observed bubble growth and release patterns seen in the experimental channel boiling videos.

Requirements

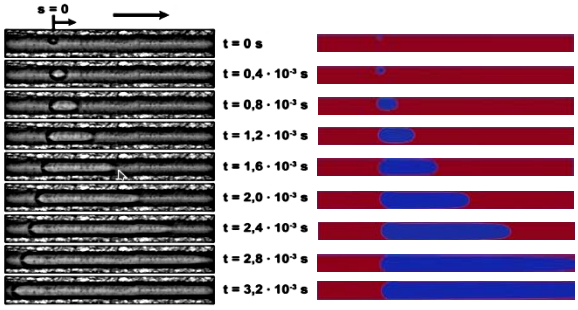
- Basic knowledge in heat, mass transfer, fluid dynamic

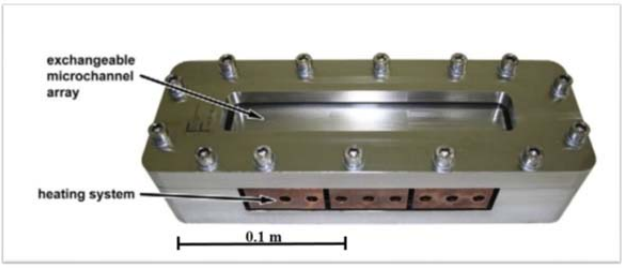
Beneficial Skills

- CFD in OpenFOAM, MATLAB

You will learn

- Methods of scientific research,
- Two-phase flow study at microscale
- Microscale physics of phase change heat transfer





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