Computational Math Seminar

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Numerical Modeling of Segmented Flows at Microscales

Abstract:

Enhancement in heat transfer at small scales is an active area of study followed by many researchers. Use of non-boiling two phase flows in the form of segmented flows has become one of the interesting methods for achieving higher cooling capacities. Segmented flows (also known as slug flows, plug flows, or Taylor flows) are a series of moving liquid segments, which are separated by a gas or another liquid medium. These flows are known as gas-liquid or liquid-liquid two phase flows, respectively. The effective phenomenon in heat transfer enhancement is internal circulations inside the liquid slugs, which help to mix the liquid. The main focus in the present research is on heat transfer of gas-liquid segmented flows using numerical simulations based on the concepts of Computational Fluid Dynamics (CFD). As shown in the literature review large gaps exist in research, which need further studies. The target of this research is providing details on hydrodynamics and heat transfer in gas-liquid two phase flows, which can be helpful in understanding the whole process better. Based on the literature reviewed, the numerical modeling can be conducted using single phase or two phase simulations. Both single phase and two phase numerical simulations have been performed in this research and the results have been compared.