

Preface

It is known that in fluid dynamics boundary conditions are of huge importance, because they have relevance to heat and mass transfer efficiency across interface surfaces. Especially, in cases where the boundary condition is for the interface of a vapor or gas–vapor mixture and its liquid phase some difficult problems appear, which are not yet made clear. This is because the derivation of the boundary condition requires detailed information of molecular phenomena at the interface, whereas the governing equations (the Navier–Stokes equations in fluid dynamics) can be derived from macroscopic conservation laws. Thus, there is great necessity to formulate correctly the discontinuity of initial and boundary conditions for precise and productive solutions of different interface transfer problems. The joint solution of the Boltzmann kinetic and fluid dynamic equations is used for the study. On the base of this approach, the limiting matter possibilities in respect of transfer processes can be found. Another task is the study of the conjugate problem: vapor (vapor–gas) mixture–liquid (condensate) at condensation, evaporation, and boiling. The processes in following systems are investigated: superfluid helium (He-II), because efficiency of heat transfer in He-II is highest among all liquids, and liquid metals, because thermal conductivity of these substances is very high. The application of above mentioned approach for determination of the shape of interface surface at non-equilibrium conditions in film boiling is presented.

Non-Equilibrium Phenomena near Vapor-Liquid
Interfaces

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