
PREFACE

Beginning with the monograph of Hewitt and Taylor (1970), about a dozen books dedicated to liquid film flows have been published around the world in the last quarter century. Many of them were issued in the USSR: Vorontsov, Tananayko (1972), Gimbutis (1988), Kholpanov, Shkadov (1990) etc. Hydrodynamics and the processes of transfer in films constitute a rather small part of the field of mechanics. Nevertheless, the interest in moving films is rather great due to the distinguishing properties of the films and their broad application in technics. The strong influence of both viscosity and surface forces is a peculiarity of thin films. The interaction of inertial, viscous and capillary forces results in flow instability and the emergence of nonlinear waves that strongly influence the heat-mass transfer. The description of nonlinear wave formation and its influence on the transfer processes is one of the basic problems of liquid film mechanics. It should be noted that due to the variety of the observed physical phenomena, the results of thin film flow study are of great interest not only for liquid film mechanics, but also for more general scientific disciplines such as wave theory, multiphase media mechanics, and heat-mass transfer theory.

The principal goal of this book is the generalization of existing knowledge on the wave motion of gravitational thin liquid films and on the processes of transfer in the wave regimes of a flow. This is the only book that is expressly dedicated to wave phenomena in films. The greater part of the material is based on the works of the authors of the present publication which were carried out during 1970-1990.