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# ANALYSIS OF HEAT TRANSFER ACROSS LIQUID/GAS INTERFACE IN CYLINDRICAL COLUMN

**Abstract**

Heat/mass transfer on the moving gas-liquid interface is an important subject directly related to many industrial applications from crystal growth to cooling of electronic devices. In the case of non-uniform temperature in liquid the overall scenario depends on thermo- capillary convection in liquid which is affected by moving gas along the interface. Stability of thermocapillary flows generated by a temperature gradient directed along the liquid surface has been extensively studied in the case of a thin liquid layer. Another important class of thermocapillary flows is that of flows in a cylindrical liquid bridge, which is connected with the floating-zone crystal growth technique. In a finite cylindrical zone, a number of instability modes with different azimuthal wavenumbers have been found but as a rule the phenomena in the gas surrounding the liquid bridge have been ignored.

Recently, the effect of ambient gas on the stability of flow inside liquid bridge has become an object of investigation and it will be object of the future experiment on the ISS. Space experiment JEREMI (Japanese European Research Experiment on Marangoni Instabilities) is devoted to the study of the threshold of hydrothermal instabilities in two-phase systems. The present study is one of the first steps on the way of the experiment preparation.

We report the results of numerical study of two-phase flows in annulus. The internal column consists of solid supports at the bottom and top, while the central part is a liquid zone filled with viscous liquid and kept in its position by surface tension. We present results of numerical study on thermocapillary (Marangoni) convection in liquid bridge of Pr=68 when the interface is subjected to an axial gas stream. The gas flow is co- or counter-directed with respect to the Marangoni flow. The attention is focused on different flow pattern and instabilities.