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# THE SURFACE OSCILLATION OF THERMOCAPILLARY CONVECTION IN SHALLOW ANNULAR POOLS

**Abstract**

The buoyant thermocapillary convection in an open Annular Pools is discussed in the present paper, which has important research value in crystal growth and thin film scientific field. The temperature gradient load in radial direction will cause the fluid surface tension to be non-uniform, coupling the action of gravity on the ground, the thin layer fluid will be driven to form the buoyant thermocapillary convection. When the radial direction temperature difference achieves a limit value, the liquid surface will have rule oscillatory occurrences, the changes of the thickness of the liquid layer $h$ and the temperature difference can cause the changes of the oscillation mode. A displacement sensor, which employees the laser triangulation principle for accurate displacement measurement with excellent accuracy and sensitivity, was used for measurement of surface oscillation. The change curve of the displacement on some spot of the fluid surface has been surveyed at a variety of the liquid thickness $h$ and the radial direction temperature difference $\Delta T$. The threshold oscillation and the characteristic frequency were carried on analyses and so on. The results of the present research have been demonstrated as follows:

- While the temperature difference continues increases, the surface oscillation expresses two transition processes, oscillation starting and oscillation vanishing. It is different from the mode of develops to the high frequency direction.
- The relationship of nondimensional number $Ra$ and $Bo$ has been analyzed. When the bond number $Bo$ is smaller than 3.7, the surface tension caused by the Marangoni effect controls the fluid oscillation. When the bond number $Bo$ is larger than 4.5, the buoyancy effect controls the fluid oscillation.