

MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)  
Science Results from Ground Based Research (4)

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ONSET OF OSCILLATORY THERMOCAPILLARY CONVECTION DEPENDING ON ASPECT  
RATIO IN FLOATING HALF ZONE

**Abstract**

Key word: transition process, thermocapillary convection, floating zone, microgravity

The relationship of critical Marangoni number depending on the geometrical aspect ratio is essential for onset of oscillatory thermocapillary convection. The space experiments of D2 show that the critical Marangoni numbers increase with the increasing aspect ratio for liquid bridge of 5 cst silicon oil, however, the ground experiments by Velten et al gave the reversed conclusion for tetracosane liquid bridge. The ground experiments were performed in the liquid bridges of 5 cst and 10 cst silicon oils, and the critical Marangoni numbers increased firstly, and then decreased with the increasing aspect ratio. Similar experimental results were obtained for a cylindrical liquid bridge and a slender liquid bridge. The results of numerical simulations were obtained to compare with the experimental results in liquid bridge of 5 cst silicon oil in the microgravity environment and the ones of 10 cst silicon oil on the earth's gravity condition, and the comparisons were in good agreement.