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

Author: Prof. Qi KANG
National Microgravity Laboratory, Institute of Mechanics, Chinese Academy of Sciences., China, kq@imech.ac.cn

Prof. Li DUAN
National Microgravity Laboratory, Institute of Mechanics, Chinese Academy of Sciences., China, duanli@imech.ac.cn
Dr. Di WU
Institute of Mechanics, Chinese Academy of Sciences, China, wudi@imech.ac.cn
Mr. Huan JIANG
Institute of Mechanics, Chinese Academy of Sciences, China, jianghuan@imech.ac.cn
Mr. Chu ZHANG
Institute of Mechanics, Chinese Academy of Sciences, China, zhangchu@imech.ac.cn
Prof. Wenrui HU
Chinese Academy of Sciences, China, wrhu@imech.ac.cn

THERMOCAPILLARY CONVECTION EXPERIMENT IN AN OPEN ANNULAR POOL ON SJ-10 SATELLITE

Abstract

Thermocapillary convection has always been a hot topic of great importance in either crystal growth or thin films science. A space experiment about thermocapillary convection in an open Annular Pool has been done on SJ-10 satellite. A payload for space experiment has been established, which includes a cylindrical annuli thermocapillary convection system, a thermocouple temperature controlling system and measurement system, a thermal infrared imager, a high-precision displacement sensor, and experiment controlling system. The temperature measurement system and the displacement measurement system are adopted to measure the fluid temperature, as well as the interface time evolution process, for the purpose of studying the fluid oscillation behaviors in the instability and transition processes of the thermocapillary flow system. The infrared thermal imager is used to measure the changes in the surface temperature of the fluid, and to study the convection pattern transformation of the thermocapillary flow system. Some experiments have been done on the ground and in microgravity, the experiment results will be compared and analyzed. The convection pattern transformation and oscillation behavior are the main characteristics of the convection instability and transition. It is helpful to deeply understand the nonlinear characteristics, flow stability, bifurcated transition.