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**Three-dimensional oscillatory thermocapillary convection in liquid bridge under microgravity.** (English) [Zbl 1015.76073](#)

*Int. J. Heat Mass Transfer* 44, No. 19, 3765-3774 (2001).

Summary: Three-dimensional oscillatory thermocapillary convection in silicone oil liquid bridge is studied numerically by means of finite volume method. The results reveal the existence of two different oscillatory modes: pulsating and rotating oscillations. Close to the onset of oscillation, the pulsating oscillatory convection is observed. With the increment of Marangoni number  $Ma$ , the pulsating oscillatory convection is replaced by rotating oscillatory convection, where the temperature and velocity fields demonstrate the characteristics of rotation. An approximately linear relationship between  $Ma$  and dimensionless main frequency  $f^*$  is found for aspect ratio height-to-radius of liquid bridge  $As = 4.0$  in periodic oscillatory regime. This relationship becomes a little more complex for  $As = 1.0$ .

**MSC:**

[76R05](#) Forced convection

[76D45](#) Capillarity (surface tension) for incompressible viscous fluids

[80A20](#) Heat and mass transfer, heat flow (MSC2010)

[76M12](#) Finite volume methods applied to problems in fluid mechanics

Cited in **3** Documents

**Keywords:**

microgravity; Marangoni convection; floating zone; three-dimensional oscillatory thermocapillary convection; silicone oil liquid bridge; finite volume method; pulsating oscillatory convection; rotating oscillatory convection

**Full Text:** [DOI](#)