

Marangoni convection in a variable viscosity fluid layer with feedback control.

ABSTRACT

Feedback control was applied to the steady Marangoni convection in a horizontal layer of fluid with variable viscosity and free-slip at the lower boundary heated from below and cooled from above. Prediction for the onset of convection are obtained from the analysis by numerical technique. The effects of feedback control are studied by examining the critical Marangoni numbers and wave numbers. It is shown that the onset of Marangoni convection with variable viscosity can be delayed and the critical Marangoni number can be increased through the use of feedback control.

Keyword: Linear stability theory; Marangoni convection; Variable viscosity; Feedback control; Free-slip; Deformable free surface.