Boundary Effect on Marangoni Convection in a Variable Viscosity Fluid Layer

Abstract

The onset of Marangoni convection in a horizontal fluid layer with a free surface overlying a solid layer heated from below is studied. Problem is focused on the effect of the solid layer depth or its conductivity. The viscosity group, Rv, Biot number, Bi, depth ratio, dr and conductivity ratio, kr, are significant on determining the critical Marangoni number Mc with the corresponding critical wavenumber ac. The characteristics problem is solved numerically. Results show that the temperaturedependent viscosity destabilizes the fluid system but it behaves oppositely when a higher relative thermal conductivity ratio or higher depth ratio is taken.