Radiation effects on Marangoni convection boundary layer over a permeable surface

ABSTRACT

The problem of Marangoni convection boundary layer flow that can be formed along the interface of two immiscible fluids when the wall is permeable, where there is suction or injection effect, is considered. Similarity equations are obtained through the application of similarity transformation techniques. The effects of suction/injection and radiation parameters on the heat transfer characteristics are numerically studied using the shooting method for a fixed value of the Prandtl number (Pr=0.7). Numerical results are obtained for the surface temperature gradient or the heat transfer rate as well as the temperature profiles for some values of the governing parameters. Comparisons with known results from the open literature show very good agreements. The results indicate that the heat transfer rate at the surface decreases as the radiation parameter increases. Further, results show that multiple (dual) solutions exist for a certain range of the governing parameters.

Keyword: Boundary layer; Marangoni convection; Radiation; Suction/injection.