Marangoni convection in a fluid saturated porous layer with a deformable free surface.

ABSTRACT

The stability analysis of Marangoni convection in porous media with a deformable upper free surface is investigated. The linear stability theory and the normal mode analysis are applied and the resulting eigenvalue problem is solved exactly. The Darcy law and the Brinkman model are used to describe the flow in the porous medium heated from below. The effect of the Crispation number, Bond number and the Biot number are analyzed for the stability of the system. It is found that a decrease in the Crispation number and an increase in the Bond number delay the onset of convection in porous media. In addition, the system becomes more stable when the Biot number is increases and the Daeff number is decreases.

Keyword: Deformable; Marangoni; Porous; Stability.