

Brief Communication

Variable gravity effects on thermal instability in a porous medium with internal heat source and inclined temperature gradient

Sherin M. Alex, Prabhamani R. Patil * prabha@annauniv.edu and K.S. Venkatakrishnan

Department of Mathematics, Anna University, Chennai 600025, India

Received 27 September 2000; received in revised form 9 January 2001; accepted 2 May 2001

Abstract

The onset of convection in a horizontal fluid saturated isotropic porous layer, induced by inclined temperature gradient and internal heat source, subject to a gravity field varying linearly with location along the gravitational acceleration direction, is investigated using Galerkin technique. The boundaries are assumed to be impermeable and perfectly conducting. It is seen that the value of the variable gravity parameter plays a decisive role on the onset of convection. When the variable gravity parameter is zero and positive, an increase in the heat generation due to internal heat source advances the onset of convection in both the presence and absence of inclined temperature gradient. On the other hand, when the variable gravity parameter is negative, the opposite effect is seen. Further, it is observed that at the onset of convection the favourable mode is always the stationary longitudinal mode.

Keywords: Convection; Porous medium; Variable gravity field; Inclined temperature gradient; Internal heat source; Galerkin technique

*Corresponding author. Tel.: +091-044-2351126

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