Universiti Teknologi MARA

A STUDY OF ONSET ON BÈNARD-MARANGONI CONVECTION WITH INTERNAL HEAT GENERATION

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STUDENT'S DECLARATION

I certify that this report and the research to which it refers are the product of my own work and that any ideas or quotation from the work of other people, published or otherwise are fully acknowledged in accordance with the standard referring practices of the discipline.

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ABSTRACT

A study of fluid mechanics in convection may bring significant result in daily life especially in industrial sector such as crystal craft industry, welding, pump and others. In this research, classical linear stability theory was used to investigate the onset of Bénard-Marangoni convection in a fluid layer with a flat surface heated from below influenced by internal heat generation factors when the non-dimensional Rayleigh number and Marangoni number are linearly dependent. This study uses a combination of analytical and numerical approaches to obtain, for the first time, a detailed description of the marginal stability curves for the onset of steady and overstable convection, which significantly increases the numerical results of previous researchers. The research performs asymptotic analysis of the oscillatory Bénard-Marangoni within the limits of both long and short wavelength instability and presents the results of analytical calculations illustrating the effects of different problem parameters on the marginal curves.

Keywords: Bénard-Marangoni Convection, internal heat

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