

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**TEMPERATURE DEPENDENT VISCOSITY AND FEEDBACK
CONTROL BY GALERKIN METHOD IN A BINARY FLUID
SATURATED ANISOTROPIC POROUS LAYER**

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ABSTRACT

Rayleigh-Benard convection are known as the coordinated flow of a closed fluid between two heating or insulating plates. To produce a temperature difference, the system is heated from below and cooled from above. The existence of two gradients that diffuse at a different rate, known as double-diffusive has attracted interest in convection problems. In the presence of temperature-dependent viscosity and a feedback control effect, this system is considered a horizontal porous layer saturated with a Boussinesq binary fluid. The main problem of this study is to keep the system stabilize because maintaining the stability of the system can help to improve the process, optimize efficiency, and control the fluid. To understand how temperature-dependent viscosity and feedback control in a double diffusive binary fluid layer saturated in a porous layer impact the convection, this research aims to discover the marginal stability curves for the onset of Rayleigh-Benard convection. These effects were applied to the double-diffusive binary fluid and the critical Rayleigh number for rigid-free, and rigid-rigid representing the lower-upper boundary were obtained by using the Galerkin method expansion procedure. The finding will determine the stability of the system through the marginal stability curves that can be obtained using Maple software. Hence, it is found that the feedback control effect will stabilize the system and the lower-upper boundary conditions of rigid-rigid are more stable. For future studies, this research can be extended for different types of fluids and considered for two or more layers of fluid.