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Analysis of Rayleigh Benard Convection with Electro-Ferro magnetic effect in a Couple stress fluid

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1 INTRODUCTION AND OBJECTIVE

Rayleigh Benard convection, or convection in a flat, horizontal fluid layer heated from below, is the most commonly considered kind of convection. They involve horizontal fluid layers subjected to constant differential heating with or without constant differential salting at the horizontal borders. The lateral borders are often believed to be far away, and their effect on the above two convection difficulties is overlooked. These issues' application areas include solar ponds, geothermal reservoirs, and cosmological challenges. Both the experimental and theoretical investigations of Rayleigh-Benard convection are very productive. The investigation focuses on the vertical rotational onset and the double diffusion effect across a horizontal channel with a couple stress fluids. For the electro- and ferro-magnetic fields in the layer, the governing equations are formulated. By using eigenfunctions and reduced Fourier expansions, the partial differential equations are reduced to ordinary differential equations. The investigation's main objective is to analyse the stability using the critical Rayleigh number. The Ginzburg-Landau equation is used to calculate heat and mass transfer using the proper parameters, such as the Nusselt number and the Sherwood number. The graphs are made to demonstrate the stability analysis using Rayleigh number and wave number influences in the horizontal double diffusion process in Rayleigh-Benard convection.

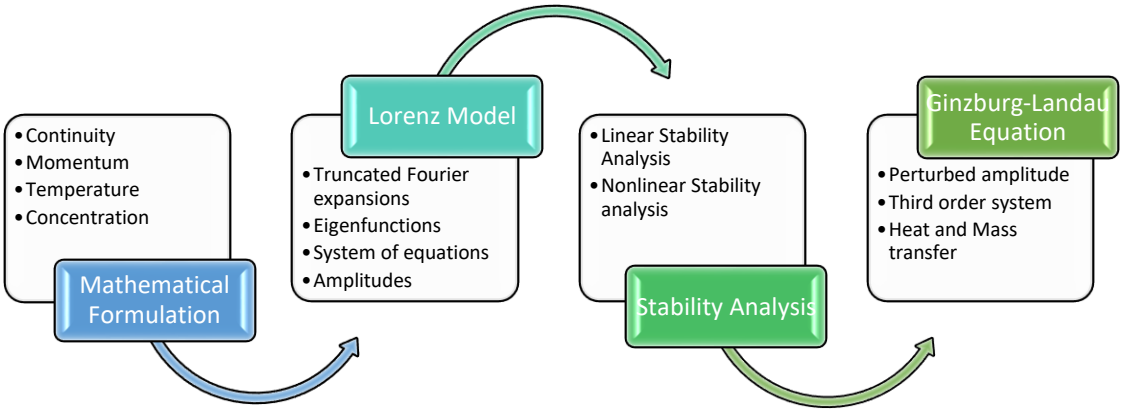

Fig:1 A flowchart demonstration of the problem

2. RESULTS AND HIGHLIGHTS

In the current experiment, an asymmetric channel was used to examine the Rayleigh thermal and solute numbers when electro-ferro magnets were present. The focus of the work is on the identification of linear and nonlinear electro-convection issues that arise in rotating and nonrotating ferro-convection systems. to link the more straightforward Ginzburg-Landau model with the analytically complex Lorenz model of rotating and non-rotating ferro convection. Finding the stable region with the critical Rayleigh number [1] and the physical parameters is one of the problem's additional objectives.

REFERENCES

1. S. Chandrasekhar, “Hydrodynamic and hydromagnetic stability,” *Courier Corporation*, 2013.