Nonlinear Rotating Double-Diffusive Oscillatory Convection

Haseena Begum[1], V. Anuradha[2], Rawoof Sayeed[3] and Y. Rameshwar[1]

[1]Department of Mathematics, University College of Science, Osmania University-500007, Telangana.
[2]Department of Mathematics, Govt. City College, Hyderabad-500002, Telangana.
[3]Department of Mathematics, Department of Mathematics,
Mufffakham Jah College of Engineering and Technology, Hyderabad-500034, Telangana.

Abstract

The weakly nonlinear properties of rotating thermohaline convection near the onset of oscillatory convection are studied by deriving the two-dimensional coupled complex Landau-Ginzburg amplitude modulation equations to understand the flow behavior near the onset. It is observed that, at some critical parameter value, a spatially homogeneous steady state loses stability to oscillations whose wavelength and frequency can understood in terms of linearized equations. It is also observed that when nonlinear effects are included, these oscillations are modulated over a long time and space scales by a quantity satisfying the equations. The chaotic pattern of the flow enhances as the thermal Rayleigh number increases. From the study of the linear stability analysis of these equations, we have found the conditions for the Benjamin-Feir instability and traveling and standing waves.