

## **Analysis of Three-Dimensional Longitudinal Rolls Induced by Double Diffusive Poiseuille-Rayleigh-Benard Flows in Rectangular Channels**

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**Abstract :** This numerical study investigates the travelling wave's appearance and the behavior of Poiseuille-Rayleigh-Benard (PRB) flow induced in 3D thermosolutale mixed convection (TSMC) in horizontal rectangular channels. The governing equations are discretized by using a control volume method with third order Quick scheme in approximating the advection terms. Simpler algorithm is used to handle coupling between the momentum and continuity equations. To avoid the excessively high computer time, full approximation storage (FAS) with full multigrid (FMG) method is used to solve the problem. For a broad range of dimensionless controlling parameters, the contribution of this work is to analyzing the flow regimes of the steady longitudinal thermoconvective rolls (noted R//) for both thermal and mass transfer (TSMC). The transition from the opposed volume forces to cooperating ones, considerably affects the birth and the development of the longitudinal rolls. The heat and mass transfers distribution are also examined.

**Keywords :** heat and mass transfer, mixed convection, poiseuille-rayleigh-benard flow, rectangular duct

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