

Numerical Investigation of the Upper Bounds on the Convective Heat Transport in a Heated From Below Rotating Fluid Layer

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We apply the Galerkin method in order to obtain numerical solution of the Euler-Lagrange equations for the variational problem for the upper bounds on the convective heat transport in a fluid layer under the action of intermediate and strong rotation. The role of the numerical investigation in such kind of variational problems is to obtain the upper bounds for the case of small and intermediate values of the Rayleigh and Taylor numbers in addition to the analytical asymptotic theory which leads to the upper bounds for the case of large values of the above two characteristic dimensionless numbers. The application of the Galerkin method reduces the Euler - Lagrange equations to a system of nonlinear algebraic equations. This system is solved numerically by the Powel hybrid method. We observe that the Powel hybrid method guarantees satisfactory fast rate of convergence from the guess solution to the solution of the system of equations. We present and discuss several results from the numerical computations.