

The viscosity-splitting method for the Boussinesq problem

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Resumo/Abstract: In this report, we consider the viscosity-splitting method for the Boussinesq problem. By using this technique, the considered problem is decoupled into two subproblems, and each subproblem is solved more easily than the original one. In the first step, two linear elliptic problems with semi-implicit schemes for the convection terms are solved. The advantage of using such numerical technique is that a linear system with the constant coefficient matrices is obtained and then the computation becomes easy. In the second step, a system consists of a Stokes problem and a linear elliptic problem is solved. The main results include that (1) Establish the stability of numerical solutions in the time viscosity-splitting method; (2) Provide the convergence results of strongly second order for the velocity and temperature and strongly first order for the pressure. Finally, some numerical results are provided to display the performances of the developed numerical algorithms.