In this thesis is presented mathematical model of stratified 2D flow of viscous incopressible fluid and its program realization. Basic equations of fluid flow in Boussinesq approximation were solved by finite volume method on structured nonortogonal grid. Discretization was done by the principle of semi-discretisation. The space derivative was solved by AUSM method with MUSCL velocity reconstruction. The viscid terms were solved through auxiliary grids. During time discretization artificial compressibility method was used in dual time. The resulting system of ODEs is integrated in time by a suitable Runge–Kutta multistage scheme. Numerical experiments were calculated for flow with Reynolds number equals 1000. Further 3 numerical experiments are presented with different boundary conditions.