THE STABILITY AND ERROR ANALYSIS OF MIXED FINITE ELEMENT METHOD FOR SOLVING NAVIER-STOKES PROBLEM

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Abstract

We consider the discretization of the steady and non- steady states incompressible Navier-Stokes problem in two-dimensional domain by a mixed finite element method. By using the standard formulation of this problem in the primitive variables and taking as approximation space V_h and Q_h of the mixed finite element for the velocity and the pressure.

In this thesis, we consider three cases, the first case for the steady-state and non steady-state Navier-Stokes problem and proved some lemmas and theorems for the stability of the semi-discrete and fully-discrete mixed finite element method, the second case for the steady-state Navier-Stokes problem and proved some lemmas for the ellipticity and continuity of this method and the third case for the steady-state and non steady-state Navier-Stokes problem and proved some theorems for the error estimate of the semi-discrete mixed finite element method.