Least-Squares Mixed Finite Element Methods for the Incompressible Magnetohydrodynamic Equations

Least-Squares Mixed Finite Element Methods for the Incompressible Magnetohydrodynamic Equations

Shao-qin Gao (1)

Abstract Least-squares mixed finite element methods are proposed and analyzed for the incompressible magnetohydrodynamic equations, where the two vorticities are additionally introduced as independent variables in order that the primal equations are transformed into the first-order systems. We show that there hold the coerciveness and the optimal error bound in appropriate norms for all variables under consideration, which can be approximated by all kinds of continuous element. Consequently, the Babu$\check{s}$ka-Brezzi condition (i.e. the inf-sup condition) and the indefiniteness are avoided which are essential features of the classical mixed methods.

Key words   The incompressible magnetohydrodynamic equation   Vorticity   Least-squares mixed finite element method.

通讯作者