Axisymmetric equilibrium with flow and pressure anisotropy in Hall MHD ATSUSHI ITO, National Institute for Fusion Science, JESUS RAMOS, MIT, NORIYOSHI NAKAJIMA, National Institute for Fusion Science — Effects of the Hall current and pressure anisotropy on ellipticity of axisymmetric toroidal MHD equilibrium with strong poloidal and toroidal flow are studied. In MHD, the equilibrium equation so-called the generalized Grad-Shafranov equation can be both elliptic and hyperbolic partial differential equation depending on poloidal flow velocity and velocities of MHD waves. It has been shown that the model equations extended from Hall MHD equations to include pressure anisotropy obtain the linear dispersion relation that exactly coincides with the kinetic one for cold ions and adiabatic electrons. A set of equilibrium equations has been derived and its ellipticity has been examined. An ellipticity criterion for poloidal flow velocity has been found for tokamaks. It is the poloidal sound speed in the small wave length limit modified by pressure anisotropy. The ellipticity condition for general axisymmetric configuration would be obtained from nonexistence of real roots of fourth-order algebraic equation for characteristics.

Atsushi Ito
National Institute for Fusion Science