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**Prediction of plasma rotation and neoclassical toroidal viscosity in KSTAR discharges based on plasma fluid formulation** CHEONHO BAE, National Fusion Research Institute, WESTON STACEY, Fusion Research Center, Georgia Institute of Technology — Braginskii's flow rate of strain tensor formalism [1], as extended first to low collisional plasmas in axisymmetric circular toroidal flux surface geometry [2,3], then to elongated axisymmetric flux surface geometry [4], has recently been extended to 3-D non-axisymmetric toroidal flux surface geometry [5]. In toroidally non-axisymmetric plasmas, the leading order neoclassical parallel viscosity terms in the flow rate of strain tensor do not vanish to cause flux surface averaged toroidal angular momentum damping [5] and eventually slow down the plasma rotation. The formalism of Ref. 5 provides a means to systematically evaluate the "neoclassical toroidal viscosity (NTV)" in curvilinear plasma geometry based on the plasma fluid equations. As the first step of its application, a practical formalism for circular plasmas, given in the appendix of Ref. 5, will be applied to KSTAR discharges to predict the rotation and NTV, which can also be compared with actual rotation measurements to numerically validate the NTV damping effects.

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