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Bounce-averaged kinetic theory for a D-shape plasma and its application for ITG-TEM turbulence simulation LEI QI, Natl Fusion Res Inst, T.S. HAHM, Seoul National University, Korea, JAE MIN KWON, GAHYUNG JO, Natl Fusion Res Inst — A general D-shape plasma with shaping effects including elongation, triangularity, and Shafranov shift has significant effects on the tokamak performance. Important physics phenomena in tokamaks associated with relatively low frequency fluctuations, such as ion temperature gradient (ITG) mode, trapped electron mode (TEM), and turbulence driven $\mathbf{E} \times \mathbf{B}$ flows etc., can be influenced by the shaping effects. Meanwhile, it has already been demonstrated that bounce-averaged kinetic theory is a sophisticated tool to provide a firm foundation for the description of such low frequency turbulence phenomena [1,2]. Thus, in this study, we extend the previous bounce-averaged kinetic theory to be applicable for a D-shape plasma by taking into account of the shaping effects. The extended bounce-averaged kinetic theory is self-consistent and can be used, for a computational simulation purpose, to study the shaping effects on the low frequency ITG-TEM turbulence in general tokamak geometry. We apply the extended theory to model kinetic electron responses in the gyrokinetic simulation code gKPSP [3]. Several benchmark simulation results will be presented to demonstrate the applicability and efficiency of the bounce-averaged kinetic electron model in general tokamak geometry.

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Lei Qi
Natl Fusion Res Inst

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