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Gyrokinetic Simulation of Turbulent Transport for I-mode Edge Plasmas HONGWEI YANG, Institute for Fusion Theory and Simulation, Zhejiang University, Hangzhou 310027, China, TIANCHUN ZHOU, Harbin Institute of Technology, Harbin 150001, China, YONG XIAO, Institute for Fusion Theory and Simulation, Zhejiang University, Hangzhou 310027, China, ZHIHONG LIN, Department of Physics and Astronomy, University of California, Irvine, California 92697, USA — I-mode is an attractive candidate for tokamak operation with good energy confinement similar to H-mode but poor particle confinement similar to L-mode [1-2]. Additional benefits about I-mode include no impurity accumulation and free of ELMs. Many tokamaks, such as Alcator C-Mod, AUG, DIII-D and EAST, have achieved I-mode operation recently. However, theory and simulation remains insufficient to explain the I-mode formation and its transport behavior. In this work, an electrostatic gyrokinetic simulation using GTC code is carried out for the I-mode physics. Linear simulations find that two comparable instabilities co-exist for both short wavelength and long wavelength modes. The passing electron response cannot be treated adiabatically for those mode numbers close to that of weekly-coherent-mode (WCM), which is shown to account for the I-mode formation and transport behavior. Nonlinear simulations give a turbulent heat transport level consistent with the experimental value. But the particle transport from the simulation remains elusive from the experiment, which requires further investigation. References: [1] D. G. Whyte et al. 2010 Nuclear Fusion, 50(10), 105005. [2] A. E. Hubbard et al. 2011 Physics of Plasmas, 18(5), 056115.

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