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TH/P2-23: Turbulent Transport due to Kinetic Ballooning Modes in High-Beta Toroidal Plasmas

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Turbulent transport in high-beta toroidal plasmas is investigated by means of a newly developed simulation code solving electromagnetic gyrokinetic equations combined with gyro-fluid equations for electrons. The new code allows simulations of turbulent transport at high-beta with smaller computational cost and less numerical difficulty than solving gyrokinetic equations for both electrons and ions which have disparate spatio-temporal scales. The code is applicable to a model configuration of Large Helical Device (LHD) experiments as well as tokamaks, and linear calculations show that kinetic ballooning modes (KBMs) are destabilized at high-beta. A nonlinear simulation for a tokamak plasma shows that heat transport due to KBM at high-beta (beta=2%) is significantly larger than that due to ion temperature gradient mode (ITG) driven turbulence at zero beta because of high KBM growth rate and weak zonal flow.

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