Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Theoretical and numerical studies of wave-packet propagation in tokamak plasmas[1] ZHIXIN LU, School of Physics and Fusion Simulation Center, Peking University, FULVIO ZONCA, ALESSANDRO CARDINALI, Associazione EURATOM-ENEA sulla Fusione, Frascati — Theoretical and numerical studies of wave-packet propagation are presented to analyze the time varying 2D mode structures of electrostatic fluctuations in tokamak plasmas, using general flux coordinates. Instead of solving the 2D wave equations directly, the solution of the initial value problem is obtained, following the propagation of wave-packets generated by a source and reconstructing the time varying field. As application, the 2D WKB method is applied to investigate the shaping effects of tokamak geometry on the lower hybrid wave propagation and absorption. Meanwhile, the mode structure decomposition (MSD) method is used to handle the boundary conditions and simplify the 2D problem, casted into two nested 1D problems. The MSD method reduces to the well-known "ballooning formalism" when spatial scale separation applies. This method is used to investigate the time varying 2D electrostatic ITG mode structure with a mixed WKB-full wave technique. The time varying field pattern is reconstructed and the time asymptotic structure of the wave-packet propagation gives the 2D eigenmode and the eigenvalue. As a general approach to investigate 2D mode structures, our method also applies for waves with general source/sink terms, either by an antenna or nonlinear wave interaction.

[1]This work is supported by the Chinese Scholarship, Euratom Communities, NSFC, National Basic Research Program of China(973), and National ITER Program of China.

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Date submitted: 10 Jul 2012 Electronic form version 1.4