Abstract Submitted
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Collective Alfvénic fast ion transport evaluation using Landau closure models[1] DONALD SPONG, Oak Ridge National Lab, JACOBO VARELA, LUIS GARCIA, Universidad Carlos III de Madrid, YASHIKA GHAI, Oak Ridge National Lab, MIKE VAN ZEELAND, General Atomics — Energetic particle (EP) instabilities related to various EP resonances with Alfvén waves are known to drive enhanced levels of transport in both tokamaks and stellarators. The prediction of this transport and its long-term intermittency characteristics are important goals for both the ignition margin of fusion systems, as well as first wall protection. While various evaluations of single particle confinement in the presence of Alfven activity have been made, relatively little has been done based upon self-consistent stability models to assess the collective transport that is driven by the evolving phase relations of the fast ion density perturbations with the potential and magnetic field fluctuations. This transport can be readily assessed using the FAR3d nonlinear model which uses Landau closure methods to incorporate the wave-particle resonances that drive EP instabilities. Applications have been made to several well-diagnosed DIII-D discharges. EP transport flows in both 1D and 2D are diagnosed, and an erosion of EP density gradients leading asymptotically to a critical gradient limit is observed.

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