Abstract Submitted
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Near threshold conditions justify critical gradient model for Alvenic mode driven relaxation of fast ions[1] NIKOLAI GORELENKOV, KATY GHANTOUS, PPPL, Princeton University, WILLIAM HEIDBRINK, Irvine University, CA, MICHAEL VAN ZEELAND, General Atomics, CA — Future burning plasma performance will be limited by the constraints to confine energetic superalfvenic fusion products, which can drive several low frequency Alfvénic instabilities. Expected multiple resonances help to justify the model developed recently, called critical gradient or 1.5D reduced quasilinear diffusion model. Similar conditions are expected in burning plasmas with TAE instabilities in a non virulent nonlinear regime. The 1.5D model make use of TAE/RSAEs linear theory. One critical element of the presented model is that it requires averaging over the time comparable to the fast ion slowing down. Another element is that the fast ion diffusion near the resonance does not flatten the distribution function whose gradient is maintained by the collision scattering. Further validations of this model justify its use in case of relatively high collisions. With the parametric plasma dependencies embedded in the model and with the quantitative normalization to NOVA-K growth rates the 1.5D model application to DIII-D experiments is well positioned for validations. Good agreement is summarized here for absolute values of the deduced neutron rate and for the time behavior of fast ion losses near the AE activity thresholds. 1.5D model is applicable for ITER and other BPs.

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