Abstract Submitted
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1D Resonance line Broadened Quasilinear (RBQ1D) code for fast ion Alfvenic relaxations and its validations[1] NIKOLAI GORELENKOV, Princeton Plasma Phys Lab, VINICIUS DUARTE, San Paulo University, MARIO PODESTA, Princeton Plasma Phys Lab — The performance of the burning plasma can be limited by the requirements to confine the superalfvenic fusion products which are capable of resonating with the Alfvnic eigenmodes (AEs). The effect of AEs on fast ions is evaluated using the quasi-linear approach [Berk et al.,Ph.Plasmas'96] generalized for this problem recently [Duarte et al.,Ph.D.'17]. The generalization involves the resonance line broadened interaction regions with the diffusion coefficient prescribed to find the evolution of the velocity distribution function. The baseline eigenmode structures are found using the NOVA-K code perturbatively [Gorelenkov et al.,Ph.Plasmas'99]. A RBQ1D code allowing the diffusion in radial direction is presented here. The wave particle interaction can be reduced to one-dimensional dynamics where for the Alfvnic modes typically the particle kinetic energy is nearly constant. Hence to a good approximation the Quasi-Linear (QL) diffusion equation only contains derivatives in the angular momentum. The diffusion equation is then one dimensional that is efficiently solved simultaneously for all particles with the equation for the evolution of the wave angular momentum. The RBQ1D is validated against recent DIIID results [Collins et al.,PRL'16].

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Nikolai Gorelenkov
Princeton Plasma Phys Lab

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