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Simulation of RSAE/EAE and TAE activity in a reversed shear DIII-D case¹ DONALD SPONG, Oak Ridge National Lab., MICHAEL VAN ZEE-
LAND, General Atomics — The energetic particle gyrofluid model TAEFL has been applied to a DIII-D case where RSAE, TAE and EAE activity was present. This is a useful analysis tool because: (1) it retains the primary non-perturbative affect of fast ions on Alfvénic mode structures, i.e., the coupling of MHD cosine and sine parities by fast ion diamagnetic flows [which in the $\phi = 0$ plane causes up-down asymmetries], (2) it is applicable to non-circular shaped tokamak equilibria, (3) it focuses on only the most unstable modes, and (4) an efficient implicit stepping algorithm has been developed, allowing rapid scans of linear growth rates and mode structures for cases with significant poloidal coupling. Analysis of the above DIII-D case has identified EAE, RSAE and TAE modes at sub-Alfvénic beam velocities (down to ~ 0.28 times the Alfvén velocity). The dominant AE mode is a sensitive function of the q -profile and fast ion parameters. Also, the non-perturbative nature of this model yields mode structures that are consistent with the experimental coherence measurements.

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