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Nonlinear Simulations of Energetic Particle-induced Geodesic Acoustic Mode G.Y. FU, R. NAZIKIAN, R. BUDNY, M. GORELENKOVA, Princeton University — An Energetic Particle-induced Geodesic Acoustic Modes (EGAM) was previously shown to exist based on analytic theory and numerical simulation [1], in agreement with the recent experimental results of the beam-driven GAM-like n=0 mode in DIII-D [2]. In this work, nonlinear simulations of EGAM are carried out using a hybrid model in which the thermal plasma is modeled as a fluid whereas the energetic particle component is described by the drift-kinetic equation. For an analytic energetic particle distribution function, simulation results show initial saturation due to the flattening of particle distribution function in velocity space, followed by a bursting feature with frequency chirping. In order to model the DIII-D experiments more closely, realistic simulations have been carried out using the experimental neutral beam deposition profile from the TRANSP/NUBEAM code. Numerical results show mode bursting with clear radial propagation. The calculated mode frequency, mode radial extent, and density fluctuation level are consistent with the experimental observation in DIII-D [2].

[1] G. Y. Fu, Phys. Rev. Letts. 101, 185001 (2008)
[2] R. Nazikian et al., Phys. Rev. Letts. 101, 185001 (2008).

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