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The nonlinear dispersion relation of geodesic acoustic modes ROBERT HAGER, KLAUS HALLATSCHEK, Max-Planck-Institut für Plasmaphysik — The energy input and frequency shift of geodesic acoustic modes (GAMs) due to turbulence in tokamak edge plasmas are investigated in numerical two-fluid turbulence studies. Surprisingly, the turbulent GAM dispersion relation is qualitatively equivalent to the linear dispersion but can have drastically enhanced group velocities. Such propagation velocities, which are comparable to the diamagnetic drift, allow for the formation of global GAM eigenmodes of several centimeters width. These would certainly be recognizable in experiments and might explain the GAM frequency plateaus in ASDEX Upgrade. In case of equilibrium magnetic fields with broken up-down symmetry the energy input due to the turbulent transport may favor the excitation of GAMs with one particular sign of the radial phase velocity relative to the magnetic drifts and may lead to periodic bursts of GAM and turbulence activity. This behavior resembles strikingly the experimentally observed pulsation during the I-phase in ASDEX Upgrade or the quiet periods in NSTX.

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