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Theory of external geodesic acoustic mode excitation KLAUS HALLATSCHEK, Max-Planck-Institute for Plasma Physics, Garching, Germany, GEORGE R. MCKEE, University of Wisconsin-Madison, Madison, Wisconsin, USA
— It is extremely appealing to be able to externally excite geodesic acoustic modes in a tokamak, either for diagnostic purposes, since the GAM frequency is dependent on the ion and electron temperature as well as the flux surface shapes, or, provided sufficiently large amplitude is achievable, to artificially reduce the turbulent transport, since GAMs are theoretically expected to impact the transport. It can be shown that injection of momentum by neutral particle beams or various plasma waves tends to be extremely inefficient. In contrast resonant excitation by magnetic perturbations induced by external coils is a viable and potentially efficient method. (In principle, this could already be done at present, e.g., in the DIII-D tokamak with the in-vessel RWM stabilization coils [I-coils]). The action of external coil currents on the interior flux surfaces of the plasma has been studied by means of a novel dynamic equilibrium code as well as analytically, deriving a surprisingly simple transfer function. The response of the turbulent plasma to the external driving has been studied using nonlocal NLET code runs. The results offer several control knobs to influence the drive effectivity and aid in designing a GAM drive antenna.

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