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Double adiabatic theory of driven collisionless geodesic acoustic modes (GAMs) in toroids[1] ADIL HASSAM, ROBERT KLEVA, WRICK SENGUPTA, University of Maryland — The GAM is an axisymmetric oscillation of a toroidal magnetically confined plasma, resulting from an interplay between poloidal plasma rotation and perpendicular flux tube compression from the B field gradient. The frequency is super-parallel-sonic, ie, $\omega \sim$ (ion thermal speed)/R, greater than the parallel acoustic mode which is lower by a factor of q. Consequently, collisionless geodesic acoustic modes in tokamaks can be described by the Chew-Goldberger-Low double-adiabatic fluid closures. This allows a simpler nonlinear formulation. We use these equations to study driven, collisionless GAMs in tokamaks. The motivation for this study is a proposal by Hallatschek and McKee to drive GAMs on the D3D tokamak at resonance. The drivers in the CGL theory include external magnetic forces to effect flux surface displacements as well as sources to provide modulated non-axisymmetric ion heating. We show that the linear mode frequency from CGL theory agrees with previous kinetic results. Comparisons will be made between different approaches to resonate the mode. Nonlinear effects will be evaluated. Results of a 2D toroidal numerical simulation of driven GAMs are described

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