Generation of streamers due to the four wave modulational instability[1] DANIEL MCCARTHY, Southeastern Louisiana University, C.N. LASHMORE-DAVIES, A. THYAGARAJA, UKAEA, KRISTI SCHMILL, Southeastern Louisiana Univeristy — It is well known that Charney-Hasegawa-Mima equation is unstable to a four-wave modulational instability that results in the strong growth of zonal (poloidal) flows, which are the $k_y = 0$ component of the electrostatic potential. Similarly, this nonlinear system is also unstable to the generation of streamers which are the radial analog of zonal flows. Analytically, the dispersion relation for streamers is considerably more complicated because the governing equation is cubic in teh growth rate for streamers, as opposed to quadratic for zonal flows. Previously, work has been done that describes the stability of streamers in the limit of $q << k_y$ where q is the poloidal wave vector of the streamer, and k_y is the radial wave vector of the background turbulence. In this work, we develop general analytical expressions for the growth rate of the streamer instability that is general for all q. These are compared to the growth rates for the zonal flow and a comparison of the realtive strengths for these instabilities is presented. It is found that the zonal flow is generally much stronger, except for the case where the background turbulence is inhomogeneous and elongated poloidally.

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