Angular Momentum Associated with Modes Involving Magneto-thermal Reconnection*

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An extensive series of experiments have confirmed that the observed "spontaneous rotation" [1] phenomenon in axisymmetric plasmas is connected to the excitation of diverse collective modes [2] that can be excited in a variety of regimes. In particular, "internal" electromagnetic modes, that produce magnetic reconnection and that acquire characteristic phase velocities in high temperature (low collisionality) regimes, can carry angular momentum. Thus, they become relevant toward identifying the origin of the spontaneous rotation observed within the central region of the plasma column. Consequently the expression for the angular momentum of relevant reconnecting modes is presented. Given the absence of observed macroscopic "internal" modes in regimes when peaked velocity profiles [4] and significant electron temperature fluctuations emerge, the conditions are investigated where mesoscopic modes, involving electron temperature fluctuations [3] and magnetic reconnection, can produce the angular momentum transport process needed for the formation of these profiles. The growth rates of the relevant reconnecting modes are of the dissipative kind such as that related to a finite viscosity discussed in Ref. [5].

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[4] A. White *et al.*, 2014 *Int. Conf. on Sherwood Fusion Theory* (San Diego, CA).

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