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Interaction of an External Rotating Magnetic Field with the Plasma Tearing Mode Surrounded by a Resistive Wall[1] S.C. GUO, Consorzio RFX, Padova, Italy, M.S. CHU, General Atomics — The effect of an externally rotating magnetic field on the plasma tearing mode surrounded by a resistive wall is studied. A pair of tearing mode evolution equations describing the magnetic energy and angular momentum balance across the magnetic island are used. The model is valid for both the RFP and the tokamak. The pair of equations is solved numerically to determine the equilibrium amplitude and phase of the tearing mode with respect to that of the external magnetic field and the phase stability of the combined system. When the external magnetic field amplitude is large, the tearing mode frequency is locked to that of the external field above minimum amplitude. Dependence of the critical unlocking amplitude and the phase stability on parameters relevant to present day experiments are obtained. In the opposite limit, when the amplitude is small, the external field is not sufficient to lock the tearing mode below a critical amplitude. Dependence of this critical locking amplitude on plasma characteristics and external wall distance is also obtained. Possible utilization of the external rotating field to stabilize the tearing mode is also discussed.[2]

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[2]The authors acknowledge discussion with R. Fitzpatrick.

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