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On the Possibility of Observation of Magnetorotational Instability in High Temperature Plasmas[1] V.I. PARIEV, V.V. MIRNOV, S.C. PRAGER, University of Wsconsin and Center of Magnetic Self-Organization in Lab and Astrophysical Plasmas — Magnetorotational instability (MRI) is believed to be crucial for understanding of the origin and amplification of magnetic field in gravitationally collapsing objects such as accretion disks. Experimental verification of MRI in laboratory experiments is an active area of research. There are several efforts to observe MRI in liquid metal devices. High temperature laboratory plasmas attract less attention because strong magnetic fields suppress MRI in magnetically confined systems. We present linear eigenmode analysis of instabilities related to MRI and driven by sheared rotational flows in cylindrical plasmas. In the vicinity of the rational surfaces with $k_{||} = 0$, magnetic field is not strongly perturbed allowing for excitation of a spatially localized version of MRI under the condition similar to Suydam criteria, $k_{||}^2 V_A^2 < |d\ \Omega^2\ /d\ \ln R\ |$. The shear of the magnetic field imposes a severe restriction on the rotational velocity needed for instability. We analyze modifications of this criteria and the role of resistive effects and large gradients of rotational flow in the dynamics of the instability. Applications for Madison Symmetric Torus reversed field pinch experiments are discussed.

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