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Effect of sheared axial flow on the stability of the interchange mode in a hardcore Z-pinch plasma JEFFREY FREIDBERG, ALEXEI KOUZNETSOV, JAY KESNER, Plasma Science and Fusion Center, Massachusetts Institute of Technology — It is well known that a static (i.e. $\mathbf{v}$=0) closed field line configuration, such as a Z-pinch, levitated dipole, or hard-core Z-pinch, can be stabilized against ideal MHD interchange modes if the plasma pressure falls off sufficiently rapidly with respect to increasing minor radius. The stabilizing effect is provided by plasma compressibility. However, many laboratory plasmas exhibit sheared velocity flows, $\mathbf{v}' \neq 0$, (due to non-ambipolar plasma transport) and this flow affects marginal stability. An analysis has been carried out to investigate the effect of axially sheared flow on ideal MHD stability in a hard-core Z-pinch. Specifically, the goal is to learn whether sheared flow is good, bad, or neutral for MHD stability? Analytic calculations of marginal stability for several idealistic velocity profiles have been carried out. It is found that all three options are possible depending on the shape of the shear profile. This reflects the competition between the destabilizing Kelvin-Hemholtz effect and the fact that shear makes it more difficult for interchange perturbations to form. Also numerical calculations will be presented using more realistic experimental profiles of pressure and velocity to compare with the idealized analytic profile results.

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