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Numerical Investigations of $m = 0$ sausage instabilities in Axisymmetric Z-pinch in 5-moment Two-Fluid Model YU TAKAGAKI, ERIC MEIER, URI SHUMLAK, University of Washington — The growth rates for a $m = 0$ sausage instability in axisymmetric Z-pinch are investigated in ideal MHD and 5-moment two-fluid model via Washington Approximate Riemann Plasma (WARPXM) code. The WARPXM code developed at the University of Washington implements numerical simulations by using Discontinuous Galerkin (DG) methods. The growth rates obtained by using 5-moment two-fluid models for the shear-free Z-pinch are larger compared with the ideal MHD simulations but comparable to the Hall MHD simulations presented by V.I. Sotnikov et al. at the small-k modes. As increasing the wave number k, the growth rates show the peak at $kr_p \approx r_p/r_{Li}$, where r_p is the pinch radius and r_{Li} is ion Lamor radius, and the further stabilizing effects at the large-k modes that are consistent to the former numerical studies done by J. Scheffel et al. using the Vlasov-fluid model and K. Tummel et al. using the fully kinetic model. Applying the radial sheared flow, $\partial_r v_z \neq 0$, is our future work and expected to further stabilize the sausage instabilities as observed in Fusion Z-pinch Experiment (FuZE) and the numerical studies done by V.I. Sotnikov et al. using ideal and Hall MHD models.

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