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PIC simulations of the MagnetoRotational instability in electron-positron plasmas GIANNANDREA INCHINGOLO, THOMAS GRISMAYER, GoLP/IPFN, Instituto Superior Tecnico, Universidade de Lisboa, Lisbon, Portugal, NUNO F. LOUREIRO, Plasma Science and Fusion Center, MIT, Cambridge, USA, RICARDO A. FONSECA, DCTI/ISCTE - Instituto Universitario de Lisboa, Lisboa, Portugal, LUIS O. SILVA, GoLP/IPFN, Instituto Superior Tecnico, Universidade de Lisboa, Lisbon, Portugal — The magnetorotational instability (MRI) is a crucial mechanism of angular momentum transport in a variety of astrophysical scenarios, as e-e+ plasmas accretion disks nearness neutron stars and black holes. The MRI has been widely studied using MHD models and simulations, in order to understand the behavior of astrophysical fluids in a state of differential rotation. When the timescale for electron and ion collisions is longer than the inflow time in the disk, the plasma is macroscopically collisionless and MHD breaks down. This is the case of the limit of weak magnetic field, i.e., as the ratio of the ion cyclotron frequency to orbital frequency becomes small. Leveraging on the recent addition of the shearing co-rotating frames equations of motion and Maxwell's equations modules in our PIC code OSIRIS 3.0, we intend to present our recent results of the analysis of MRI in electron-positron plasma in the limit of weak magnetic field. We will recall the theoretical 1D linear model of Krolik et Zweibel that describes the behavior of MRI in the limit of weak magnetic field and use it to support our results. Moving to 2D simulations, the analysis of MRI via PIC code permits to investigate also how MRI will act in comparison with other Kinetic instabilities, like mirror instability.

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