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Role of the two-stream instability in IEC devices ALBERTO MAROCCHINO, GIOVANNI LAPENTA, EVSTATI G. EVSTATIEV, RICHARD A. NEBEL, JAEYOUNG PARK, LANL — Recent experimental observations conducted on the LANL IEC device [1] suggest that the electron-electron two-stream instability can play a significant role in the physics of spherical virtual cathodes. Previous work based on fluid models suggested that the electron-electron two-stream instability would become unstable when the well depth of the virtual cathode was 14% of the applied voltage [2]. We are reconsidering this phenomenon using a 2D PIC code CELESTE2D properly modified for this particular problem. The experiments have demonstrated that a crucial parameter in the evolution of the instability is the angular momentum present in the system. We analyze this effect with a simulation campaign aimed at investigating the stability boundary for the system. We verify for each case the stability of the virtual cathode using a variety of diagnostics: wavelet transform to analyze the temporal evolution of the instability and phase space diagrams to identify its effects on the particle distribution function.

[1] J. Park et al. Phys. Plasma 12, 56315 (2005)

[2] R.A. Nebel et al. Phys. Plasma 12, 12701 (2005).

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