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Numerical Investigation of Counter-Streaming Ion Tails from Current-Carrying Instabilities in a Hollow Cathode Plasma[1] ALEXANDER VAZSONYI, BENJAMIN JORNS, University of Michigan, IAIN BOYD, University of Colorado — Erosion of thermionic hollow cathode keepers presents a challenge for Hall effect and gridded ion thrusters that are used for spacecraft propulsion. Within the past decades, the source of this erosion has been tied to ion heating by current-carrying instabilities, namely the ion acoustic instability. Existence of the ion acoustic instability in the cathode plume is based on a wealth of supporting experimental and numerical evidence, making its presence highly likely. Recent 1D kinetic simulations have demonstrated that, for sufficiently large electron drifts, current-carrying instabilities are capable of generating high energy ion tails in the direction opposite of the electron current; theoretically, these ions would then impinge on the cathode. The mechanism which produces these counter-streaming ion tails is not clear, though it was proposed that reflection-driven reverse-streaming ion acoustic waves may be the culprit. Thus, this work aims to closely analyze 1D1V Vlasov-Poisson simulations of current-carrying plasmas to determine whether counter-streaming ion acoustic waves are the plausible driver of these high energy ion tails.

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