

Abstract Submitted  
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**Generation of anomalously energetic suprathermal electrons by an electron beam interacting with a nonuniform plasma** DMYTRO SYDORENKO, University of Alberta, Canada, IGOR D. KAGANOVICH, Princeton University, PETER L. VENTZEK, LEE CHEN, Tokyo Electron America — Generation of anomalously energetic suprathermal electrons was observed in simulation of a high-voltage dc discharge with electron emission from the cathode. An electron beam produced by the emission interacts with the nonuniform plasma in the discharge via a two-stream instability. Efficient energy transfer from the beam to the plasma electrons is ensured by the plasma nonuniformity. The electron beam excites plasma waves whose wavelength and phase speed gradually decrease towards anode. The short waves near the anode accelerate plasma bulk electrons to suprathermal energies. The sheath near the anode reflects some of the accelerated electrons back into the plasma. These electrons travel through the plasma, reflect near the cathode, and enter the accelerating area again but with a higher energy than before. Such particles are accelerated to energies much higher than after the first acceleration. This mechanism plays a role in explaining earlier experimental observations of energetic suprathermal electrons in similar discharges.

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