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Particle-in-Cell modeling of the magnetized direct current microdischarge[1] DMITRY LEVKO, LAXMINARAYAN RAJA, The University of Texas at Austin — Following the Paschen's law, electrical breakdown of gaps with small pd, where p is the gas pressure and d is the interelectrode gap, requires extremely high voltages. This means that the breakdown voltage for low-pressure microdischarges is of the order of a few kilovolts. This makes impractical the generation of low-pressure dc microdischarges. The application of dc magnetic field confines electrons in the cathode-anode gap. This leads to the significant decrease of the breakdown voltage because each electron experiences many collisions during its diffusion toward the anode. However, as was obtained experimentally, magnetized low-pressure microdischarges experience numerous instabilities whose nature is still not completely understood. In the present paper, we study the influence of magnetic field on the low-pressure microdischarges. We use self-consistent one-dimensional Particle-in-Cell Monte Carlo collisions model which takes into account the electron magnetization while ions remain unmagnetized. We obtain striations in the discharge. We show that these striations appear in both homogeneous and non-homogeneous magnetic field. We find simple expression for the instability growth rate which shows that the instability results from ionization processes.

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