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Effects of electron energy probability function on the negative ion production in low pressure inductively coupled hydrogen plasmas.[1]
WEI YANG, Dalian University of Technology,China and Princeton Plasma Phys Lab, HONG LI, FEI GAO, Dalian University of Technology,China, ALEXANDER KHRABROV, IGOR KAGANOVICH, Princeton Plasma Phys Lab, YOU-NIAN WANG, Dalian University of Technology,China — Dissociative attachment of low energy electrons to vibrationally excited hydrogen molecules plays a key role in the formation of volume negative hydrogen ions. The vibrationally excited hydrogen molecules are generated in collisions with fast electrons, while negative ions are generated in collisions with low energy electrons.[1] Therefore, the generation of negative hydrogen ions greatly depends on the electron energy probability function (EEPF) The effects of EEPF on the negative ion production are investigated in low-pressure inductively coupled hydrogen plasmas. The particle species, i.e., ground-state hydrogen molecules and atoms, 14 vibrationally excited molecules, positive ions, negative ions and electrons, accompanied by the relevant chemical reactions, are included in the model. The plasma parameters, i.e., temperatures of the electrons and H atoms and number densities of all species, as a function of gas pressure, are evaluated for different EEPFs. To validate the model, the calculated EEPFs and the electron density and temperature are compared with experimental measurements; and a reasonable agreement between simulated plasma parameters and experimental data is achieved.

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Wei Yang
Princeton Plasma Phys Lab

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