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Time evolution of the electron energy distribution function in pulsed microwave magnetoplasma in H2

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Abstract-

Time evolution of the Electron Energy Distribution Function (EEDF) is measured in pulsed hydrogen microwave magnetoplasma working at 2.45 GHz. Analysis is performed both in resonance (B = 0.087 T) and off-resonance conditions (B = 0.120 T), at two pressures (0.38 Pa and 0.62 Pa), respectively, and for different incident microwave powers. The important effect of the magnetic field on the electron kinetic is discussed, and a critical analysis of Langmuir probe measurements is given. The Electron Energy Distribution Function is calculated using the Druyvesteyn theory (EEDF) and is corrected using the theory developed by Arslanbekov in the case of magnetized plasma. Three different components are observed in the EEDF, whatever the theory used. They are: (a) a low electron energy component at energy lower than 10 eV, which is ascribed to the electron having inelastic collisions with heavy species (H2, H, ions), (b) a high energy component with a mean energy ranging from 10 to 20 eV, which is generally ascribed to the heating of the plasma by the incident microwave power, and (c) a third component observed between the two other ones, mainly at low pressure and in resonance conditions, has been correlated to the electron rotation in the magnetic field.

Index Terms-

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