

Correlations between density distributions, optical spectra, and ion species in a hydrogen plasma (invited)

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Abstract-

An experimental study of plasma distributions in a 2.45 GHz hydrogen discharge operated at 100 Hz repetition rate is presented. Ultrafast photography, time integrated visible light emission spectra, time resolved Balmer-alpha emission, time resolved Fulcher Band emission, ion species mass spectra, and time resolved ion species fraction measurements have been implemented as diagnostic tools in a broad range of plasma conditions. Results of plasma distributions and optical emissions correlated with H⁺, H²⁺, and H³⁺ ion currents by using a Wien filter system with optical observation capability are reported. The magnetic field distribution and strength is found as the most critical factor for transitions between different plasma patterns and ion populations.

Index Terms-

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