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Temperature and density evolution during decay in a 2.45 GHz hydrogen electron cyclotron resonance plasma: off-resonant and resonant cases

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Abstract-

Time resolved electron temperature and density measurements during the decay stage in a hydrogen electron cyclotron resonance (ECR) plasma are presented for a resonance and off-resonance magnetic field configurations. The measurements are conducted on a ECR plasma generator excited at 2.45 GHz denominated test-bench for ion-sources plasma studies at ESS Bilbao. The plasma parameters evolution is studied by Langmuir probe diagnostic with synchronized sample technique developed for repetitive pulsed plasmas with a temporal resolution of 200 ns in typical decay processes of about 40 μs. An afterglow transient is clearly observed in the reflected microwave power signal from the plasma. Simultaneously, the electron temperature evolution shows rebounding peaks that may be related to the interplay between density drop and microwave coupling with deep impact on the Electron Energy Distribution Function. The correlation of such structures with the plasma absorbed power and the coupling quality is also reported.

Index Terms-

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