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Self-excited plasma series resonance driven by Gaussian type pulses in capacitively coupled plasmas[1] LI WANG, DE-QI WEN, YUAN-HONG SONG, YOU-NIAN WANG, School of Physics, Dalian University of Technology, PSEG TEAM — Using a Particle In Cell/Monte Carlo collision (PIC/MCC) model, we investigate the effects of PSR oscillations on the discharge properties in a Gaussian type pulse driven Argon plasma. The effects of the gas pressure, voltage amplitude, and pulse width on the resonance characteristics are also examined. When appropriate parameters are imposed, high frequency oscillations are excited between the capacitive sheaths and the inductive bulk plasma, which could greatly enhance the spatiotemporal performances of the electron power absorption, ionization rate, and electric field. It is further found that the PSR oscillations exhibit a strong dependence on the plasma properties, such as the sheath width and electron density. This dependence gives rise to the control of the resonance frequency by the external parameters. By applying Fourier analysis on the sheath voltage, the resonance frequency is found to increase with the enlargement of the voltage amplitude, while approximately be inversely proportion to the Gaussian pulse width. Besides, the PSR oscillations decay rapidly as the pressure increases due to the enhanced collisional damping.

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