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An experimental investigation of oscillating plasma bubbles and its non linear structure (evolution and effects) in a magnetized plasma system MARIAMMAL MEGALINGAM, BORNALI SARMA, Vellore Institute of Technology, Chennai Campus, Chennai, Tamilnadu, India. — This study is highlighting the experimental evidence of controlling chaos and its nonlinear behavior of fluctuations in the filamentary discharge magnetized plasma system. The cylindrical mesh grid of 80 % optical transparency has been introduced in the plasma. Argon plasma is produced in the cylindrical chamber of dimension 350 mm in length and 400 mm in diameter. The cylindrical mesh grid of 90 mm in height and 120 mm in diameter placed in the bulk plasma. The chamber is evacuated down to 1.210^{-5} mbar using both diffusion and rotary pump. Argon gas is injected by a needle valve into the chamber at working pressure of 210^{-4} mbar. The electrical Langmuir probe has been extensively used for collecting the plasma fluctuations at various positions in and around the mesh grid. The oscillation pattern shows that at the farther most position from the grid, onset of chaos occurs at a lower value of magnetic field compared to the position which is at the center of the cylindrical grid. The dynamical transition has been explained using several nonlinear techniques such as Fast Fourier Transform, Phase Space Plot, Recurrence plot, Empirical mode decomposition etc. Therefore, it can be speculated that grid is playing a major role in controlling the chaotic behavior of the plasma oscillations.

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