

Abstract Submitted
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Evidence of Mixed-mode oscillations and Farey arithmetic in double plasma system in presence of fireball VRAMORI MITRA, BORNALI SARMA, ARUN SARMA, VIT University, Chennai — Plasma fireballs are luminous glowing region formed around a positively biased electrode. The present work reports the observation of mix mode oscillation (MMO) in the dynamics of plasma oscillations that are excited in the presence of fireball in a double plasma device. Source voltage and applied electrode voltage are considered as the controlling parameters for the experiment. Many sequences of distinct multi peaked periodic states reflects the presence of MMO with the variation of control parameter. The sequences of states with two patterns are characterized well by Farey arithmetic, which provides rational approximations of irrational numbers. These states can be characterized by a firing number, the ratio of the number of small amplitude oscillations to the total number of oscillations per period. The dynamical transition in plasma fireball is also demonstrated by spectral analysis, recurrence quantification analysis (RQA) and by statistical measures viz., skewness and kurtosis. The mix mode phenomenon observed in the experiment is consistent with a model that describes the dynamics of ionization instabilities.

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