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**Observation of Transient Electric Fields in Particle-in-Cell Simulation of Capacitively Coupled Discharges** SARVESHWAR SHARMA, SANJAY KUMAR MISHRA, PREDHIMAN KAW, Institute for Plasma Research, Bhat, Gandhinagar, Gujarat, India — The analytical prediction of the presence of transient electric field regions between the bulk plasma and sheath edge in *radio frequency capacitively coupled plasma (RF-CCP) discharges* has been reported by *Kaganovich (PRL 89, 265006 2002)*. In this paper we have used the semi-infinite particle-in-cell (PIC) simulation technique to verify the theoretical prediction for the existence of transient electric field in the linear regime; it is shown that the *PIC* simulation results are in good agreement with the results predicted by analytical model in this regime. It is also demonstrated that the linear theory overestimates the transient electric field as one moves from linear to weakly nonlinear regime. The effect of applied *RF* current density and electron temperature on evolution of transition field and phase mixing regime has been explored.

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