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Dynamic and stationary structures in flowing complex plasmas

GARIMA ARORA, PINTU BANDHYOPADYAY, M.G HARIPRASAD, ABHIJIT SEN, Institute for Plasma Research — The experimental excitation of dynamic as well as stationary structures in a flowing complex plasma is presented. The experiments are performed in π -shaped Dusty Plasma Experimental (DPEX) device having a disc anode and a long grounded tray cathode. A dusty plasma is created in the DC glow discharge Ar plasma using kaolin particles. A floating copper wire is installed radially on the cathode that acts as a charged object in a flowing dusty plasma environment. The flow of the dust particle is initiated by manipulating the sheath potential around the wire using various resistances connected with the wire. The flow ranging from subsonic to supersonic to highly supersonic is generated to excite nonlinear dynamic and stationary structures. In case of subsonic flow, the wake structures are found to propagate in the upstream direction from the frame of fluid. In case of supersonic flow, the highly nonlinear structures (called as precursor solitons) are found to propagate in the upstream directions whereas the wakes propagate in the downstream direction. The propagation characteristics of these precursor solitons depend on the shape and size of the charged object over which the fluid flows. Interestingly, the stationary structures get excited for the case of highly supersonic fluid flow, which does not change its identity with time. The experimental details as well as propagation characteristics of these nonlinear structures will be presented in details in the conference.

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