Effect of size of charged object on the propagation characteristics of precursor solitons

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We address the modifications in the propagation characteristics of precursor solitons due to the different sizes of the charged object. The experiments are performed in a π-shaped Dusty Plasma Experimental (DPEx) [1] device where dusty plasma is created in a DC glow discharge Ar plasma using kaolin particles. A floating copper wire, is installed radially on midway of a long tray shaped cathode, acts as a charged object in the plasma environment. The flow on the dust fluid is initiated by suddenly lowering the potential of the charged object and as a result steady streaming solitons (precursor) radiates opposite to the flow. The size (height and width) of the potential hill is then varied by connecting a variable resistance in series with the wire to investigate the effect of propagations characteristics of these precursor solitons [2]. The amplitude, velocity and number of these precursor solitons decrease whereas the width increases with the decrease in height of the potential hill. All the experimental observations are qualitatively compared with the numerical solution of forced-Korteweg de Vries (f-KdV) model equation and it agrees quite well with the experimental findings.