

Interaction of a precursor soliton with wake structure in a flowing dusty plasma

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Fore-wake excitations ahead of a rapidly moving object in a fluid, a spectacular phenomenon in hydrodynamics that has often been observed ahead of moving ships or speed boats near the coast. The excitation of this fore-wake phenomena is recently observed in a flowing dusty plasma medium. In this specific experiment, precursor solitons and wakes structures are excited by two charged objects when the dust fluid flows supersonically over both of them. In the frame of the fluid, the solitons propagate in the upstream direction, whereas the smaller amplitude wake structures propagate in the downstream direction. A soliton, excited by one of the objects, interacts with the wake structure generated by the other object in the region between the two charged objects. After the interaction, the soliton continues to propagate in the same direction

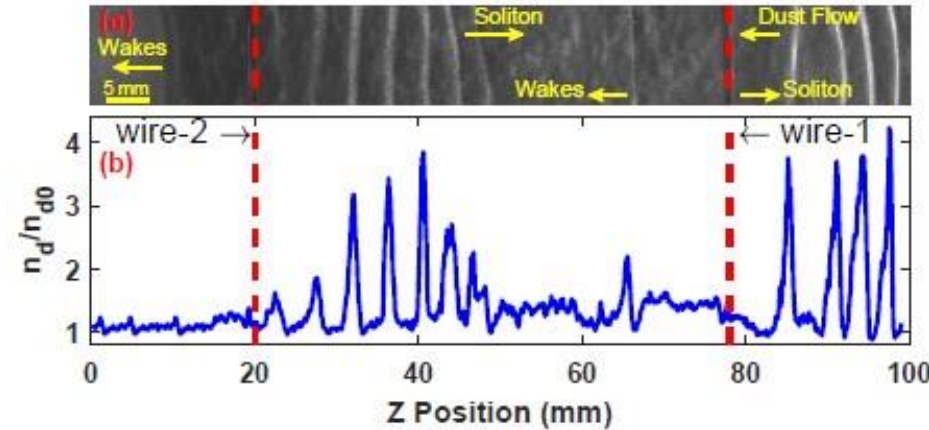


Fig: (a) A snapshot of the excited solitons and wakes by two charged objects. (b) The intensity profile of the solitons and wakes.

with a larger amplitude, a smaller width, and a higher velocity. To obtain a theoretical understanding of our experimental observations, a forced-KdV equation with two source terms is derived as a model equation.

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