

Abstract Submitted
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Observation of filamentation instability of 1-D laser plasma Solitons DEEPA VERMA, RATAN KUMAR BERA, AMITA DAS, Institute for Plasma Research — The 1-D solitary wave solutions for laser plasma system have been studied extensively. This includes complete characterization of the exact solutions (both stationary and propagating) in the parameter space of laser frequency and the group speed [1]. The dynamical evolution of these structures in 1-D has also been studied which identifies the solutions with single peak (of light wave field) as stable solutions whereas those having multiple peaks as unstable to forward Raman scattering instability [2]. It is shown here with the help of 2-D fluid simulations that the single peak solutions remain intact for several plasma periods but ultimately unstable to transverse filamentation instability. The numerical growth rate obtained from simulations is seen to compare well with the analytical value. It is also shown that the multiple peak solutions in 2-D first undergo the regular 1-D forward Raman scattering instability. Subsequently, however, they too are found to be unstable to filamentation instability. The filamentation instability having a slower growth rate appears later. [1] S. Poornakala, A. Das, A. Sen and P. K. Kaw. Physics of Plasmas, 9(5), 2002. [2] V. Saxena, A. Das, S. Sengupta, P. K. Kaw and A. Sen. Physics of Plasmas, 14(072307), 2007.

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