Seminar

Institute for Plasma Research

Title : Numerical modeling of a laser produced plasmas and a propagating charged beam in a plasma

Speaker: Dr. Vikram Singh Dharodi

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Date : 20th Nov 2021 (Saturday)

Time : 03:30 PM

Venue : Online- Join the talk:

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Abstract: We have simulated two different types of plasmas. In particular: a charged particle beam transport in plasmas using particle-in-cell (PIC) scheme, and the laser produced plasmas through continuum/fluid scheme. A charged beam which has a bunch of ions has been launched in a 2D plasma, with or without an ambient magnetic field. The PIC simulations have been performed by using OSIRIS code. We consider three types of ion beams: Line (1D source, say), Finite size line (2D, say), Disk type (2D, say). Here, we present the preliminary observations. So far we have observed the stable wake and fore-wake solitons (precursors) type structures in plasma medium. Apart from the dependency of formation and evolution of these structures on type of sources (ion beams), we are also in process to give the answer of some important questions like are these precursors have sufficient strength to accelerate the enough plasma particles, dynamics of front colliding plasma particles to these precursors. In another project, the expansion of a laser-generated plasma plume in an external magnetic field parallel to the direction of propagation of a plume has been studied. The numerical simulations have been carried out with varying strength of magnetic field in the framework of an ideal-MHD fluid model using PLUTO code. The pressure gradient of plasma and lateral pressure of magnetic field results in formation of cavity in the plasma plume and a flute type instability at its surface. A knot type structure has also been seen at the front top of plume. To develop a better physical insight into the dynamics, the plasma expansion into vacuum is also performed.