

# Seminar

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## Institute for Plasma Research

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**Title :** Nonlinear Coherent Structures in Pair Ion Plasmas

**Speaker :** Dr. Ashish Adak

Jadavpur University, Kolkata

**Date :** 08th September 2017 (Friday)

**Time :** 03.30 PM

**Venue :** Seminar Hall, IPR

### **Abstract :**

I shall present mainly three topics of my research work which I have performed during my Ph.D. tenure. In the first topic, I would like to discuss the effects of ion-neutral collisions on the dynamics of the nonlinear ion acoustic wave in pair-ion plasmas. The standard perturbative approach leads to a Korteweg-de Vries equation with a linear damping term for the dynamics of the finite amplitude wave. The ion-neutral collision induced dissipation is responsible for the linear damping. The analytical solution and numerical simulation reveal that the nonlinear wave propagates in the form of a weakly dissipative compressive soliton. Furthermore, the width of the soliton is proportional to the amplitude of the wave for fixed soliton velocity.

In the second topic, the effect of ion-ion collision on the dynamics of nonlinear ion acoustic wave in unmagnetized pair-ion plasmas will be discussed. The dynamics of the weakly nonlinear wave is governed by the Korteweg-de Vries Burgers equation. The analytical and numerical investigations reveal that the ion acoustic wave exhibits both oscillatory and monotonic shock structures depending on the frequency of ion-ion collision parameter.

The third topic covers the Rayleigh-Taylor (RT) instability in inhomogeneous pair-ion plasmas. Considering a two-fluid model for two species of ions (positive and negative), we obtain the possibility of the existence of RT instability. The growth rate of the RT instability as usual depends on gravity and density gradient scale length.

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