

Seminar

Institute for Plasma Research

- Title :** Geodesic acoustic modes with poloidal mode couplings ad infinitum
- Speaker :** Dr. Rameswar Singh
Laboratoire de Physique des Plasmas, France
- Date :** 30th December 2015 (Wednesday)
- Time :** 10.30 AM
- Venue :** Seminar Hall, IPR

Abstract:

Geodesic acoustic modes (GAMs) are studied, for the first time, including all poloidal mode (m) couplings using drift reduced fluid equations. The most generalised formulation of local GAM theory is obtained including diamagnetic and normal curvature effects. The nearest neighbor coupling pattern, due to geodesic curvature, leads to a semi-infinite chain model of the GAM with the mode-mode coupling matrix elements proportional to the radial wave number k_r . Two distinct type of GAM perturbations, based on poloidal parities, are identified here dubbed as "standard" and "complimentary" GAMs. In the limit $\rho^* \rightarrow 0$ the standard and complimentary GAMs decouple and evolve independently. The infinite chain of both standard and complimentary perturbations can be reduced to a renormalized bi-nodal chain with a matrix continued fractions. Convergence study of linear GAM dispersion with respect to k_r and the m -spectra conforms that high m couplings become increasingly important with k_r . Complimentary GAMs are in general more damped than the standard ones and hence are not observed in experiments. The radially sorted roots of standard GAMs overlap with experimentally measured GAM frequency profile in low collisionality shots in Tore Supra thus explaining the reduced frequency of GAM in Tore Supra.
