

Title: Stability of magnetized astroclouds with extreme fugacity effects

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We describe the atypical evolutionary dynamics of the Dust-Acoustic Wave (DAW) and Dust-Coulomb Wave (DCW) stabilities in self-gravitating magnetized viscoelastic spherical dusty astroclouds. It is analysed on the astrophysical fluid scales of space and time, which are, indeed, relevant for initializing bounded structure formation via the non-local gravito-electrostatic coupling mechanism. It consists of the inertial dust grains with variable electric charge alongside the non-thermal electrons and ions in a generalized correlative hydrodynamic charter. A restricted spherical wave analysis over the perturbed cloud yields a unique generalized quadratic dispersion relation with plasma-dependent multi-parametric coefficients. The triggered fluctuations are free from the viscoelasticity effects in the weakly coupled limit (WCL) against the strongly coupled limit (SCL). The electron population density, dust charge, and magnetic field act as stabilizing and accelerating agencies to the fluctuations. The ion population density and non-thermality parameter show destabilizing and decelerating effects. The cloud size shows a unique stabilizing feature in the ultra-low frequency domain. It is seen that both DAW and DCW are dispersive in the short-wavelength (acoustic) regime; but, non-dispersive in the long-wavelength (gravitational) regime. Also, the new distinctive WCL-SCL scenarios specifically investigated here are explicitly compared, pictorially explained, and illustratively discussed. The semi-analytic findings show correlative consistencies in light of the real astronomic circumstances towards triggering the formation mechanism of astrostructure creation and progressive evolution widely.

Biography

Pralay Kumar Karmakar has completed his PhD from Centre of Plasma Physics – Institute for Plasma Research (CPP-IPR), Guwahati, Assam, India. The award has been conferred to him by Gauhati University, Guwahati, Assam, India. He has joined Tezpur University as Assistant Professor in the Department of Physics, Tezpur University, Tezpur, Assam, India. He is now Associate Professor in the same department of the University.
He is interested in diversified emerging research areas, such as Astrophysical plasmas, Cosmic fluid dynamic, Stability analysics of complex media, Nonlinear dynamics, etc. Six scholars have already earned PhD degrees under his academic supervision so far. More than 100 students have successfully completed UG-PG projects under his guidance. Besides, he has published more than 100 research articles, 13 book chapters, etc. He has long been serving as an editorial board member and reviewer for diverse high-rated global research journals, and so forth.

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Session name/ number: Astrophysics
Category: Oral talk