

Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Synchronization of dust density wave by ion streaming modulation in nanodusty plasma TONUJ DEKA, HEREMBA BAILUNG, Institute of Advanced Study in Science and Technology — Synchronization of the self-excited dust density waves (DDWs) by ion streaming modulation is investigated in a rf discharge plasma. Plasma is produced in a glass cylinder of diameter 2.8 cm and length 15 cm using rf discharge (13.56 MHz, 5 to 15 W) at a pressure of 0.015 mbar of argon. Carbon nano powder of average diameter 50 nm has been introduced into the argon plasma. In presence of an ion streaming with drift velocity larger than the ion thermal speed, self-excited DDWs are observed in dusty plasma. Here, we have observed spontaneous DDWs of frequency 78 to 100 Hz originating from the void boundary above the live electrode. Dust cloud is illuminated by laser light scattering and dust dynamics are recorded using a high speed camera. The ions streaming in the outward direction from the dust void, is modulated by applying an external sinusoidal signal with frequency close to the self-excited DDW frequency into a grid. Above a threshold modulation voltage, we observe the synchronization of the DDW through the mechanism of mode suppression. The time series data are obtained from the optical pixel intensity profiles of image frames and the FFT spectrums are analyzed to interpret the observed phenomena. Typical plasma parameters are measured by a Langmuir probe.

Tonuj Deka
Institute of Advanced Study in Science and Technology

Date submitted: 03 Jul 2019

Electronic form version 1.4