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Frequency clusters in self-excited dust density waves[1] KRISTOFFER O. MENZEL, OLIVER ARP, ALEXANDER PIEL, IEAP, Christian-Albrechts-Universitaet zu Kiel, 24098 Kiel, Germany — Self-excited dust density waves were studied under microgravity conditions. Their non-sinusoidal shape and high degrees of modulation suggests that nonlinear effects play an important role in their spatio-temporal dynamics. The resulting complex wave pattern is analyzed in great detail by means of the Hilbert transform, which provides instantaneous wave attributes, such as the phase and the frequency. Our analysis showed that the spatial frequency distribution of the DDWs is usually not constant over the dust cloud. In contrast, the wave field is divided into regions of different but almost constant frequencies [1]. The boundaries of these so-called frequency clusters coincide with the locations of phase defects in the wave field. It is found that the size of the clusters depends on the strength of spatial gradients in the plasma parameters. We attribute the formation of frequency clusters to synchronization phenomena as a consequence of the nonlinear character of the wave.
[1] K. O. Menzel, O. Arp, A.Piel, Phys. Rev. Lett. **104**, 235002 (2010)

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