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Evolution of frequency clusters in the self-excited and driven dust acoustic wave[1] JEREMIAH WILLIAMS, Wittenberg University — The presence of particulate matter in a plasma system gives rise to a wide range of new plasma phenomena. These complex systems, known as dusty plasmas, support a number of new collective modes such as the dust acoustic wave. The dust acoustic wave has been the subject of intense experimental and theoretical study since being predicted in 1990 and identified experimentally in 1994. In this work, the spatio-temporal dynamics of this fundamental wave mode are examined applying the Hilbert transform to high speed video imaging of the naturally-occurring and driven wave modes. This provides insight into the instaneous frequency across the propagating wave as a function of time. While we observe the presence of frequency clusters, a result that is consistent with previous measurements, it is also observed that the frequency clusters evolve significantly over time.

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