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Dust acoustic wave growth measured in a drifting, moderately coupled, quiescent dusty plasma[1] J.R. HEINRICH, S.H. KIM, J.R. MEYER, R.L. MERLINO, University of Iowa — By introducing a grid with a variable bias potential far from the anode of a dc-glow discharge device we developed a technique to produce a drifting dusty plasma. The biased mesh trapped a secondary dust cloud that was released when the grid was returned to its floating potential. The secondary dust suspension then drifted toward the anode, and when it reached a certain distance from the grid, dust acoustic waves (DAW) spontaneously appeared in the suspension. The DAWs began growing at the location where the ion drift velocity was presumably high enough to excite the ion-dust streaming instability. The observed DAWs grew from thermal density fluctuations in a dust cloud that was large enough to support many wavelengths. The amplitude of the DAWs were measured over time to obtain the growth rate. As the wave growth saturated, a transition from linear to nonlinear waves was observed. The measured wave frequencies, wavelengths and growth rates are compared with theoretical values obtained from both fluid and kinetic theory.

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Robert Merlino
University of Iowa

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