

Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Excitation of ion waves by charged dust beams in ionospheric aerosol release experiments¹ M. ROSENBERG, S.E. CLARK, Dept. of Electrical and Computer Engineering, University of California, San Diego, P.A. BERNHARDT, Plasma Physics Division, Naval Research Laboratory — Ion waves may be excited by charged dust beams streaming across or along the geomagnetic field in the ionosphere during aerosol release experiments. The injection speed of the dust and gas is comparable to or larger than the ion thermal speed in the background plasma. The dust grains get charged by plasma collection from the ambient ionosphere, and can thus act as a heavy charged particle beam that excites instabilities in the background plasma. Wave frequencies larger than the ion gyrofrequency are considered, and collisions with neutrals are included. The theory is applied to relatively early times scales on the order of 0.1 – 1 seconds in the dust-gas cloud expansion. Further issues will be explored, including the effects of photoemission on dust charging under daytime conditions, and possible instabilities associated with the generation of ion beams due to charge exchange of the exhaust neutrals with ambient ions.

¹The research at UCSD was supported by NSF grants PHY-0903808 and ATM-0907941. The research at NRL was sponsored by the Office of Naval Research.

M. Rosenberg
Dept. of Electrical and Computer Engineering,
University of California, San Diego

Date submitted: 15 Jul 2010

Electronic form version 1.4