

Abstract Submitted
for the 4CF14 Meeting of
The American Physical Society

The effect of finite impedance ground reflections on horizontal full-scale rocket motor firings SAMUEL K. HORD, TRACIANNE B. NEILSEN, KENT L. GEE, Brigham Young University — Ground reflections have a significant impact on the propagation of sound from a horizontal rocket firing. The impedance of the ground relies strongly on effective flow resistivity of the surface and determines the frequencies at which interference nulls occur. For a given location, a softer ground, with lower effective flow resistivity, shifts the location of interference nulls to lower frequencies than expected for a harder ground. The difference in the spectral shapes from two horizontal firings of GEM-60 rocket motors, over snowy ground, clearly shows this effect and has been modeled. Because of the extended nature of high energy launch vehicles, the exhaust plume is modeled as a partially correlated line source, with distribution parameters chosen to match the recorded data sets as best as possible. Different flow resistivity values yield reasonable comparisons to the results of horizontal GEM-60 test firings.

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Date submitted: 12 Sep 2014

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