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Author: Dr. George Bowden
UNSW Canberra, Australia

Mr. Edwin Betar
Australian Space Agency, Australia

ACOUSTIC RAY TRACING OF INFRASOUND FROM RE-ENTERING OBJECTS

Abstract

Re-entering objects produce shock waves as they pass through the atmosphere at hypersonic speeds. An acoustic ray tracing model has been developed which simulates the propagation of these waves, accounting for three-dimensional variations in atmospheric temperatures and wind velocities. Modelling is presented for the re-entry of the Varda W-2 spacecraft. The source is modelled as a non-linear cylindrical blast-wave. Time of arrival and pressure ratio are estimated for ground-based infrasound sensors. The sensitivity of these measurements to the trajectory of the re-entering spacecraft and atmospheric conditions is examined.