Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Tunneling of Whistler Waves in a Simplified Model of the Upper Ionosphere-Lower Magnetosphere[1] A. S. RICHARDSON, C. CRABTREE, G. GANGULI, United States Naval Research Laboratory, E. R. TRACY, Physics Department, William & Mary — In this work, tunneling has been identified in a dipole model of the Earths magnetosphere. Because the mix of ion species in the lower magnetosphere varies with altitude, the lower-hybrid resonance can occur at two distinct altitudes. These surfaces are known to be important to the magnetospheric reflection of whistler waves, where a whistler wave traveling down from high altitude can be reflected back. However, when the two resonance surfaces are close enough to each other, tunneling transfers energy from the incoming wave to both a reflected wave and a transmitted wave. The reflected wave returns to the magnetosphere, while the transmitted wave continues down into the ionosphere. We have developed a simplified model of the magnetospheric plasma that illustrates this tunneling of whistler waves. We show how a ray splitting algorithm can be used to compute the effect of tunneling on the wave dynamics in this simplified system. Future applications of the ray splitting algorithm to ray tracing calculations in realistic magnetospheric plasmas will be outlined.

[1]This work was sponsored by the Naval Research Laboratory (NRL) Base Program and the Defense Advanced Research Projects Agency (DARPA).

Andrew Richardson
United States Naval Research Laboratory

Date submitted: 23 Jun 2020 Electronic form version 1.4