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Simulation of In-Ice Radio Propagation with Parabolic Equation Methods[1] STEVEN PROHIRA, Ohio State Univ - Columbus, RADAR ECHO TELESCOPE COLLABORATION — Parabolic equation (PE) methods have been used for decades to study the propagation of radio frequency (RF) waves in the atmosphere, and acoustic waves under the sea. They are approximate numerical solutions to Maxwell's equations that, under certain criteria, offer accurate results at a fraction of the computational cost of more exact numerical solution methods (finite-difference time-domain, FDTD). We present a first application of PE to the problem of in-ice radiowave propagation, of critical importance to radio-based detection of ultra high energy (UHE) neutrinos. We find that PE methods are a useful tool for accurate simulation of long baseline in-ice radio propagation for two reasons: 1) they give consistent results with FDTD at a fraction of the computational cost, and 2) they model propagation effects that are not currently accounted for in widely used in-ice radio simulation codes. We present implications for current and future experiments, including the Radar Echo Telescope, an under-development, next-generation UHE neutrino observatory.

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