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Finite Element methods for simulating RF wave propagation in plasmas[1] ERNEST VALEO, CYNTHIA K. PHILLIPS, JAY JOHNSON, EUN-HWA KIM, PPPL, Princeton, NJ — A two-dimensional finite-element propagation code is being developed in order to efficiently capture multi-scale structures in rf wave fields that can arise from such effects as mode conversion between long and short wavelength modes, complicated rf launcher geometry, and open field lines and localized density perturbations in the equilibrium plasma. In laboratory plasmas, in particular, these effects enter importantly in determining propagation through the plasma periphery and thus the efficiency of coupling to the core. In space plasmas, localized mode conversion can play an important role in energy transport. To demonstrate the code capability, we present the results of computations of fast wave propagation in a tokamak from a model antenna up to the region of closed flux surfaces, and of fast wave propagation in the earth's magnetosphere.

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Ernest Valeo
PPPL, Princeton, NJ

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