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Simulation of electron-Bernstein wave absorption using VORPAL

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Abstract

In certain high density toroidal devices, the electron plasma frequency may be larger than the electron cyclotron frequency. Since electron cyclotron waves cannot propagate below the plasma frequency, electron-Bernstein waves (EBW) can provide an alternative method for RF heating near the electron cyclotron frequency. Preliminary runs of electron-Bernstein wave absorption have been done using the versatile plasma simulation code VORPAL. VORPAL allows the study of wave absorption from first principles using a PIC model for the plasma electrons and a full finite difference Maxwell solver for the electromagnetic fields. Simulations using parameters typical for spherical tokamaks such as NSTX will be presented along with possible additions to the code which will expand the parameter space that can be studied and allow for studies of current drive.