Abstract Submitted
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Particle-in-Cell Simulations of an Overdense Plasma Sustained by Microwaves[1] RONALD BRAVENEC[2], Fourth State Research, CHRISTINE ROARK, Tech-X Corporation, MERRITT FUNK, LEE CHEN, Tokyo Electron America, DAVID SMITHE, PETER STOLTZ, ED KASE, Tech-X Corporation — Sustainment of plasmas by microwaves in an overdense state ($\omega < \omega_{pe}$), where the waves should be cut off, is not completely understood. Using the VORPAL particle-in-cell code,[3] we study in 2-D the interaction of electromagnetic waves propagating through an insulating dielectric at arbitrary angle into an unmagnetized plasma. Of particular interest is the predicted resonance of the waves at the location in the sheath where $\omega = \omega_{pe}$.[4] This resonance can magnify the electric fields and accelerate electrons to high energies. The simulations include ionization using a Monte-Carlo type model with energy-dependant cross section, which allows us to study the buildup of plasma. We are also studying the effects of secondary emission from the dielectric surface, where copious secondary emission is seen to reduce or even momentarily reverse the sign of the sheath electric field. Our secondary emission model allows for energy and incident angle dependant yield, and produces a specific energy spectrum of outgoing particles. Simulations for various plasma densities and gas pressures will be presented.

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[3]C. Nieter and J. R. Cary, J. Comp. Phys., **196**, 448 (2004).
[4]Yu. M. Aliev, *et al.*, Plasma Sources Sci. Tech. **1**, 126 (1992).

Ronald Bravenec
Fourth State Research

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