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Exploration of nonlinear physics in the modeling of TOP9 cross-beam energy transfer experiments at the OMEGA facility[1] L. YIN, Los Alamos Natl Lab, K. L. NGUYEN, Los Alamos Natl Lab, University of Rochester/Laboratory for Laser Energetics, A. HANSEN, University of Rochester/Laboratory for Laser Energetics, B. J. ALBRIGHT, Los Alamos Natl Lab, J. P. PALASTRO, D. FROULA, D. TURNBULL, University of Rochester/Laboratory for Laser Energetics, R. F. BIRD, W. D. NYSTROM, Los Alamos Natl Lab — Cross-beam energy transfer (CBET) allows crossing laser beams to exchange energy. The growth and saturation of CBET can involve complex, nonlinear electron and ion dynamics. Recent Tunable OMEGA Port 9 (TOP9) CBET experiments at the OMEGA facility provide a simplified, well diagnosed setting in which a single seed laser beam can interact with up to four pump beams, enabling detailed comparison with particle-in-cell modeling of the experiments in order to examine nonlinear CBET saturation. Two-dimensional (2D) VPIC simulations show that the experimental setting is stable to forward stimulated Raman scattering (FSRS) shown in prior studies to interfere with the CBET process. This allows for the examination of ion nonlinear effects on CBET in the absence of FSRS. VPIC simulations of one seed beam interacting with one pump are performed. It is found that collisional de-trapping of ions in the ion acoustic wave (IAW) is important near the linear regime at the lowest seed intensity, whereas at higher seed beam intensities, collisional de-trapping effects are small. Preliminary results from 3D studies will also be presented.

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