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Using Wave-Based Cross-Beam Energy Transfer Simulations to Improve the Ray-Based Models Used in Inertial Confinement Fusion Applications R.K. FOLLETT, D.H. EDGELL, D.H. FROULA, V.N. GONCHAROV, I.V. IGUMENSHCHEV, J.G. SHAW, J.F. MYATT, Laboratory for Laser Energetics, U. of Rochester — Ray-based models of cross-beam energy transfer (CBET) are used in radiation–hydrodynamics codes to calculate laser-energy deposition for inertial confinement fusion (ICF) experiments. In direct-drive ICF, calculations suggest that CBET is responsible for a 10% to 20% reduction in laser energy absorption.[1] In indirect drive, ray-based calculations predict full pump depletion of the outer cone beams.[2] Ray-based CBET models require artificial limiters to give quantitative agreement with experimental observables. The recent development of a 3-D wave-based solver (*LPSE* CBET) that does not rely on the paraxial or eikonal approximations allows the limitations of ray-based CBET models to be studied at conditions relevant to laser-driven ICF. The accuracy of ray-based CBET models is limited by uncertainties in the approximations used to account for the experimental realities of beam speckle, polarization smoothing, and interactions at caustics. A physics-based technique is proposed for including the effect of beam speckle in existing ray-based models that gives excellent agreement with the wave-based calculations. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

[1] I. V. Igumenshchev *et al.*, Phys. Plasmas **19**, 056314 (2012).
[2] P. Michel *et al.*, Phys. Plasmas **20**, 056308 (2013).

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