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Radiation energy transport through hydrodynamically evolving slits J.M. FOSTER, P. GRAHAM, M. TAYLOR, A. MOORE, AWE Aldermaston, C. SORCE, A. REIGHARD, S. MACLAREN, P. YOUNG, G. GLENDINNING, LLNL, B. BLUE, C. BACK, J. HUND, GA — Radiation transport through enclosed spaces with inwardly moving walls is a key component of the physics of laser-heated hohlraums. It arises in the cavity itself (where inward motion of the wall results in late-time stagnation of dense plasma on the hohlraum axis), and also in the laser-entry and diagnostic holes (where an understanding of hole-closure is important to hohlraum design and the interpretation of diagnostic data). To understand these phenomena better, we have carried out a series of experiments at the Omega laser facility. A laser-heated hohlraum is used to illuminate linear and annular slits machined in samples of solid-density tantalum and low-density, tantalum-oxide foam. Measurements of the transmitted energy are made indirectly (by measuring the temperature rise of a “calorimeter” hohlraum) and directly (by measuring the emission from the slit component, using a target in which the calorimeter hohlraum was omitted). The hydrodynamics is investigated by self-emission and absorption (backlighting) x-ray imaging of the closing slits. Simulations (using a 2-D Eulerian hydrocode) reproduce the overall energetics, the detail of the deceleration shock and axial stagnation region at the centre of the slit, and the complex shock interactions that occur at corners of the slits.

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