

ANALYTIC EXPRESSION FOR OPTIMAL HOHLRAUM WALL DENSITY*

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We apply recent analytic solutions [1] to the radiation diffusion equation to problems of interest for ICF hohlraums. The solutions provide quantitative values for absorbed energy which are of use for generating a desired radiation temperature vs. time within the hohlraum. Comparison of supersonic and subsonic solutions (heat front velocity faster or slower, respectively, than the speed of sound in the x-ray heated material) suggests that there may be some advantage in using high Z metallic foams as hohlraum wall material to reduce hydrodynamic losses, and hence, net absorbed energy by the walls. Analytic and numerical calculations suggest that the loss per unit area might be reduced ~ 20% through use of foam hohlraum walls and that this reduction factor is “universal” – independent of drive and pulse-length. We derive an explicit expression for the optimal density (for a given drive temperature and pulse-length) that will achieve this reduction factor. Since heavy ion hohlraums naturally involve such high Z foams, this work may be of some use to this HIF/IFE community.

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1. J.H. Hammer and M. D. Rosen, “A consistent approach to solving the radiation diffusion equation,” *Physics of Plasmas* **10**, 1829 (2003).