Abstract Submitted
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Bent Marshak Waves OMAR HURRICANE, JAMES HAMMER, Lawrence Livermore National Laboratory — Radiation driven heat waves (Marshak Waves[1]) are ubiquitous in astrophysics and terrestrial laser driven high energy density plasma physics (HEDP) experiments. Generally, the equations describing Marshak waves are so nonlinear, that solutions involving more than one spatial dimension require simulation. However, in this paper we show how one may analytically solve the problem of the two-dimensional nonlinear evolution of a Marshak wave, bounded by lossy walls, using an asymptotic expansion in a parameter related to the wall albedo and a simplification of the heat front equation of motion.[2] Three parameters determine the nonlinear evolution, a modified Markshak diffusion constant, a smallness parameter related to the wall albedo, and the spacing of the walls. The final nonlinear solution shows that the Marshak wave will be both slowed and bent by the non-ideal boundary. In the limit of a perfect boundary, the solution recovers the original diffusion-like solution of Marshak. The analytic solution will be compared to a limited set of simulation results and experimental data.

[1]Marshak, R.E., Phys. Fluids, **1**, 24, (1958)
[2]J.H. Hammer and M.D. Rosen, Phys. Plasmas, **10**, 1829 (2003)

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