

Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Sorting Category: 38. (E)

The Blast Wave Problem Revisited DAVID R. KASSOY,
University of Colorado — The Taylor-von Neumann-Sedov solution for a blast wave generated by *instantaneous* deposition of energy at a *point* is a paradigm example of rapid energy addition to a compressible gas. The traditional intuitive blast wave model (Barenblatt, *Scaling, self-similarity, and intermediate asymptotics*, 47-50, Cambridge University Press, 1996) can be reformulated for *time resolved* dimensional energy deposition (E') into a *finite volume* V' (initially containing fluid with a relatively small internal energy E_0' at a modest initial temperature T_0') with systematic asymptotic methods based on a small parameter $\varepsilon = E_0'/E' \ll 1$. The energy deposition occurs on a time scale t_H' , short compared to the initial acoustic time $t_a' = l'/a_0'$ (l' is the characteristic length of the finite volume V' , a_0' is the initial acoustic speed). The large local nondimensional temperature $T'/T_0' = O(1/\varepsilon)$ and speed $u'/a_0' = O(1/\varepsilon^{1/2})$ imply a large local acoustic speed and a significant local Mach number $M_l = O(1)$, respectively, such that the kinetic and internal energies are commensurate. The shock Mach number, $M_s = (1/\varepsilon^{1/2})$, is asymptotically large for the strong blast wave. It also follows that the relatively short local acoustic time $t_{al}' = l'/a' = \varepsilon^{1/2}t_a'$ is commensurate with the energy addition time t_H' . The classical similarity solution for point deposition is obtained by seeking variable combinations independent of the vanishingly small artificial length scale l' .

Prefer Oral Session
 Prefer Poster Session

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Date submitted: 11 Jul 2007

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