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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 $\varepsilon = E_0{}'/E' << 1$. 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'.

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