

## A DUSTY-GAS SHOCK TUBE

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The classical shock tube problem for a dusty gas was solved by using a modified random choice method (RCM). The initial conditions assume perfect air in the driver and channel, both at room temperature. The high-pressure driver-gas is separated by a diaphragm from the inert dusty channel gas, which is at atmospheric pressure (for convenience). Dust volume-fractions were varied from about  $5 \times 10^{-5}$  to  $2 \times 10^{-3}$ . Two transition fronts arise, namely, the shock wave, which has a sharp (frozen) front followed by a relaxation zone to an equilibrium in pressure, temperature, and gas-dust velocity and a contact front with a finite transition in gas-dust densities and temperature. The shock wave and contact surface velocities and an  $(x,t)$  plane are smaller than the equivalent-gas case and the extent of the rarefaction-wave tail is also reduced. For a given diaphragm pressure ratio the equilibrium shock pressure ratio is always greater for all dust concentrations than the pure gas case and arises from a lower value of the effective sound speed in the channel due to the dust. For some dust concentrations no sharp-fronted shock waves exist at the lower diaphragm pressure ratios. Only a relaxation region is possible (by analogy with real gases for dispersed shock waves, where the wave velocity lies between the frozen and equilibrium sound speeds).