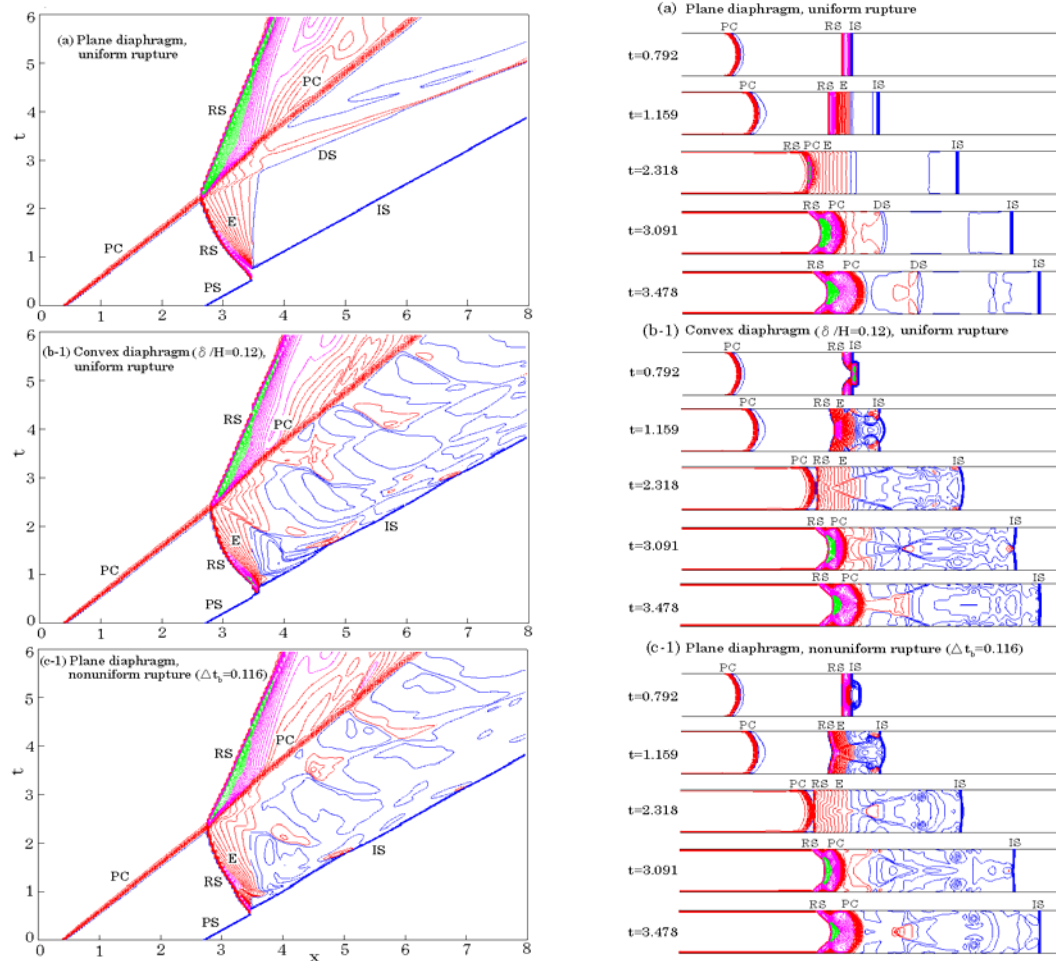


Numerical Study on the Effects of the Rupture Process of a Secondary Diaphragm in an Expansion Tube

Kage, K.¹⁾, Ishimatsu, K.¹⁾ and Okubayashi, T.¹⁾

¹⁾ Department of Production Systems Engineering, Oita University, 700 Dannoharu, Oita, 870-1192, Japan



Time-distance plots of the acoustic impedance contours on the axis

Acoustic impedance contours

Nomenclature in frontispiece:

PS: primary shock, PC: primary contact, RS: reflected shock, IS: incident shock, E: expansion, DS: disturbance shock, t: time, x: distance, δ/H : convex of diaphragm, Δt_b : difference in rupture time

These figures show the numerical results of the flow in an expansion tube by time-distance plots of the acoustic impedance and acoustic impedance contours. The disturbance shock produced by the interaction of the reflected shock at a secondary diaphragm with the primary contact is clearly observed. In the cases of the convex diaphragm and non-uniform rupture process, the disturbances are added to the disturbance shock.

Numerical conditions are as follows: Mach number of primary shock $M_s=4.0$, speed of sound ratio across primary contact $c_2/c_3=2.0$, rupture time of diaphragm $t_b=0.193$, test gas is argon.