20(

g

Fig. 3.1. Fuel support pieces
(Per GE NEDO-10174[9])

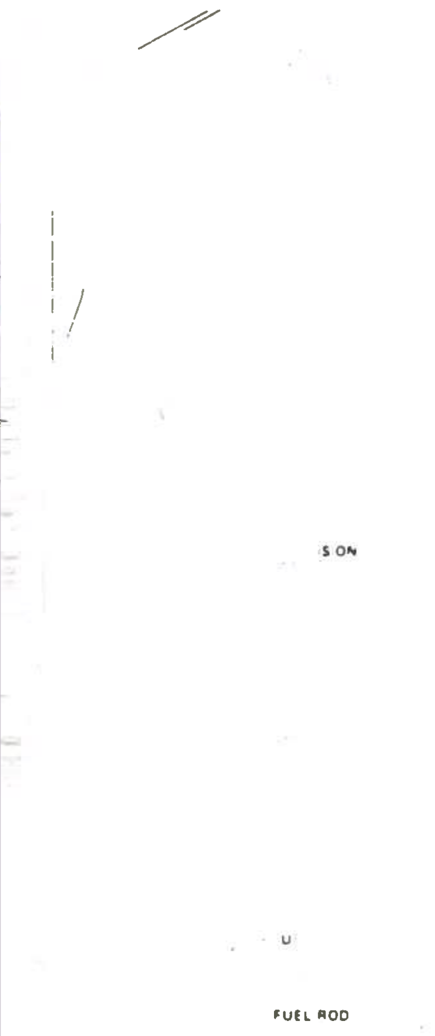

FUEL ROD

Fig. 3.3. Guide tube geometry
(Per GE[8])

Row

I

II

III

IV

.

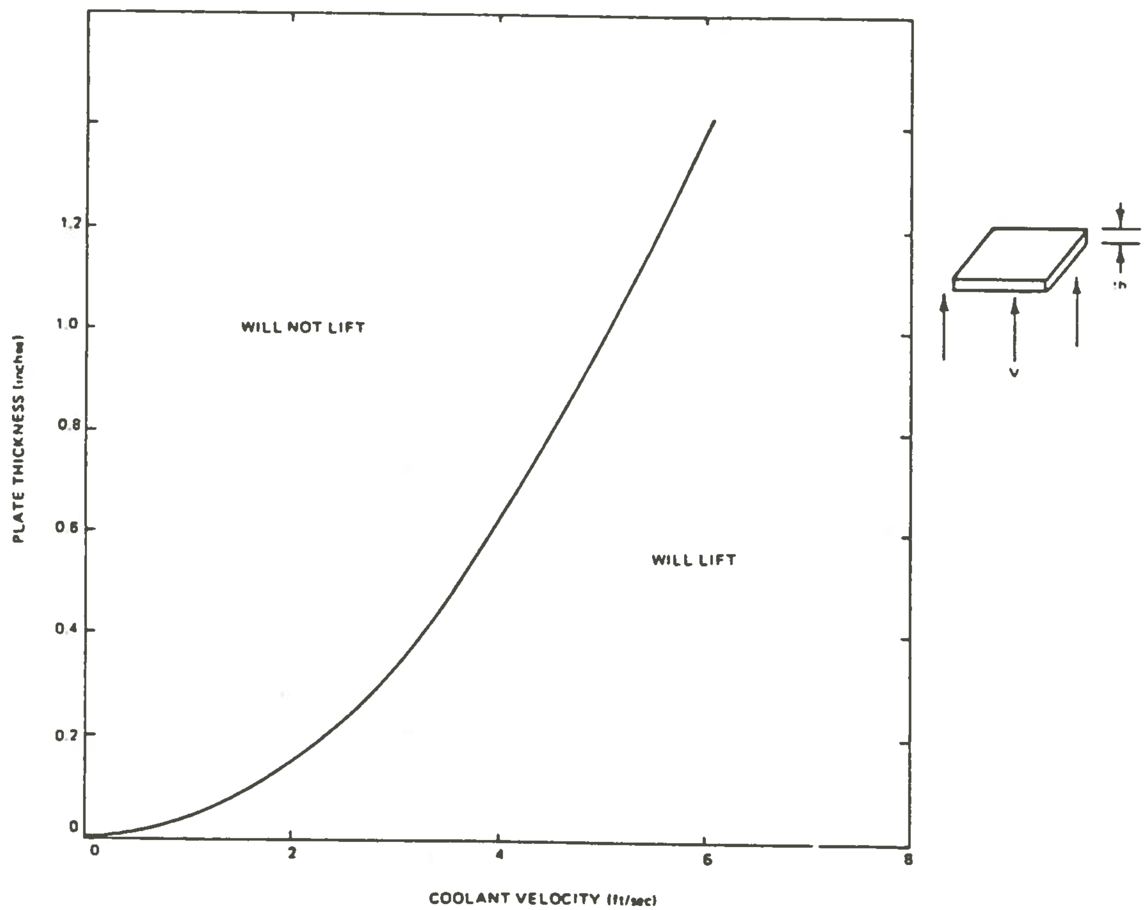
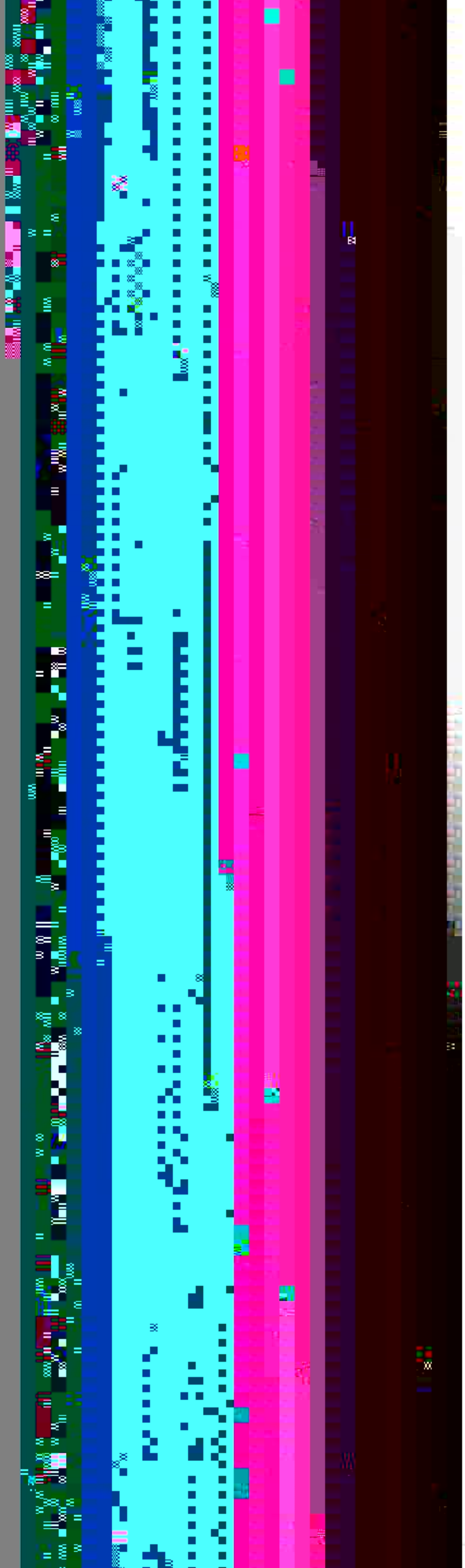


Fig. 3.6. Criteria for lift of a flat steel plate (Per GE NEDO-10174[9])



Technical Criteria of a Sensor[14]

θ

2.00

(4.1)

t of m with respect to accelerometer

(4.2)

(4.3)

$$\frac{d^2x}{dt^2} + 2\xi w \frac{dx}{dt} + w^2x = -a(t) \quad (4.4)$$

where

w = k/m, circular natural frequency

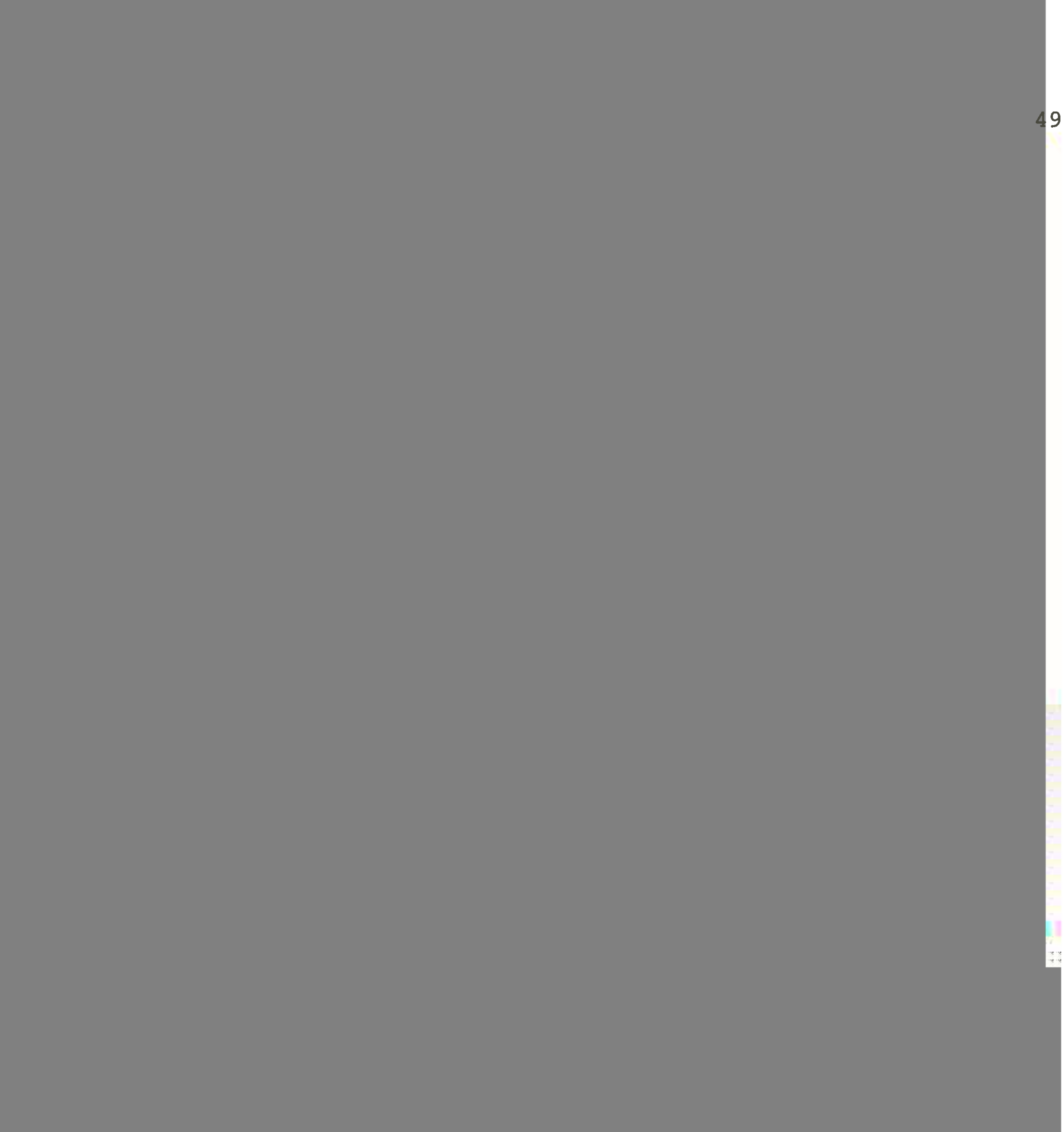


Fig. 4.6. Equivalent circuits for piezoelectric transducer system
(Per Shahrakhi[15])

Fig. 4.7. A typical acoustic emission design (Per Hill[16])

$$\alpha_{p5} = \frac{A_5}{A_1}$$

and the sound power transmission coefficient by

$$\alpha_{w5} = \left| \frac{A_5}{A_1} \right|^2 \frac{Z_1}{Z_5} \qquad (4.8)$$

$$T_1 = C_2\ C_3\ C_4\ C_5\ T_5 \qquad (4.9)$$

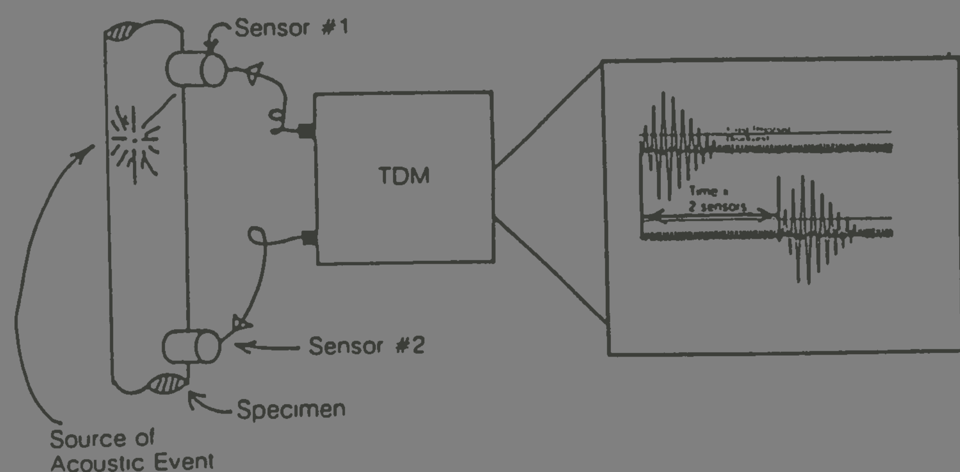


Figure 5.2 time difference module
(Per AET[20])

(5.1)

$$f(\Delta L)_{ij} = \Delta t_{ij} * V \quad (5.2)$$

$$A_i = A_o/(\bar{r}_i)^j \qquad (5.3)$$

Fig. 6.1. Vessel for the subcritical reactor assembly

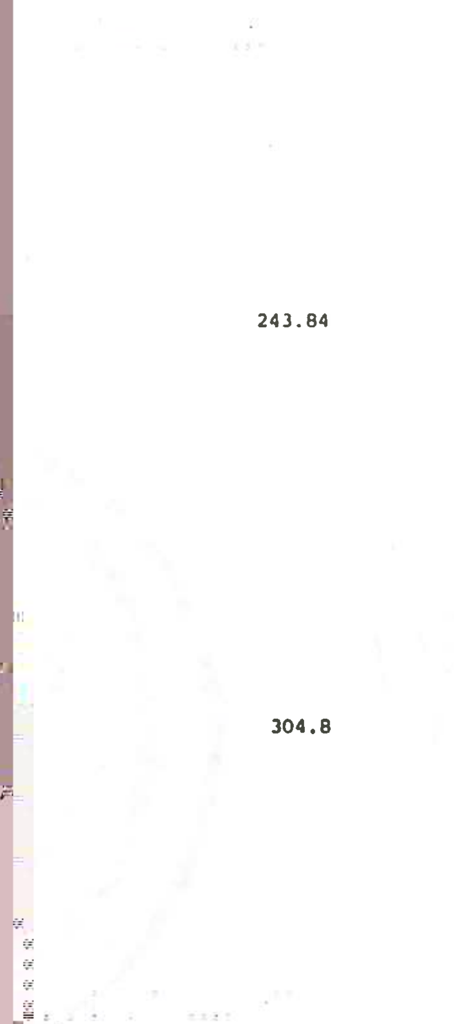


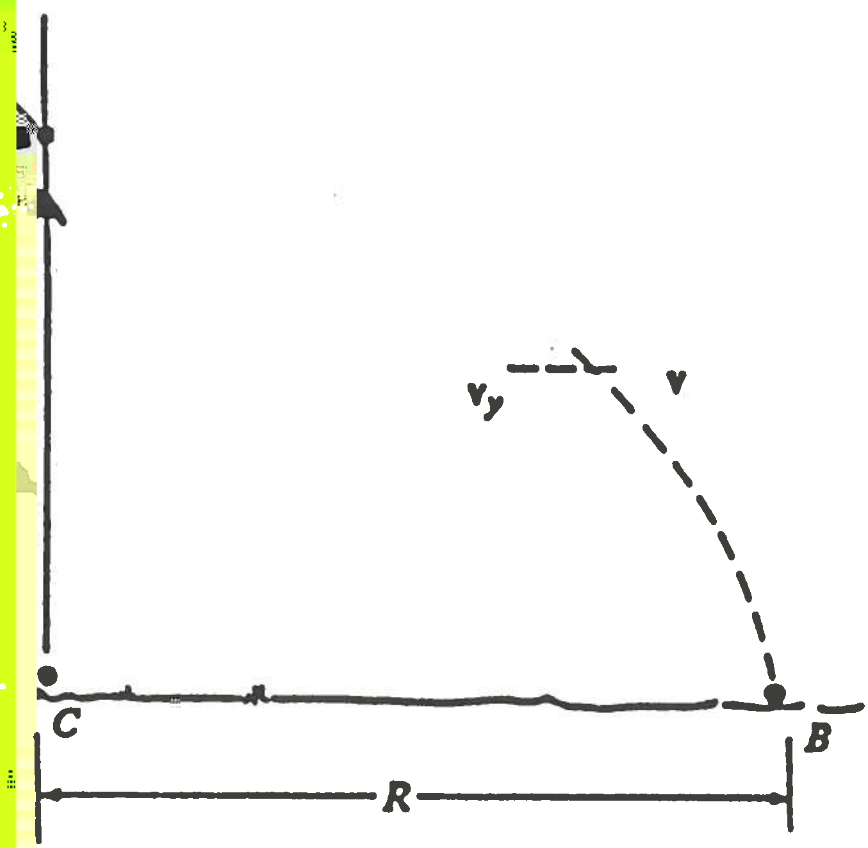
Fig. 6.2. Layout of Vessel

Hose layout for boilin

Fig. 6.4. Schematic diagram for data collection

Results and Discussion

Fig. 6 .5 . Location of each zone on the vessel



v_y
v
C
B
R

Table 6.3. Measured Velocity of Impact Wave in Vessel

n using ΔT method on the vessel full of water

4 =

the parameters and conditions listed before. This method is very slow and impractical for impact location in industry.

* See text for description of water rod

mv_2 and

here

(8.2)

$$\Sigma M_o = r \times \Sigma F = r \times m\dot{v}$$

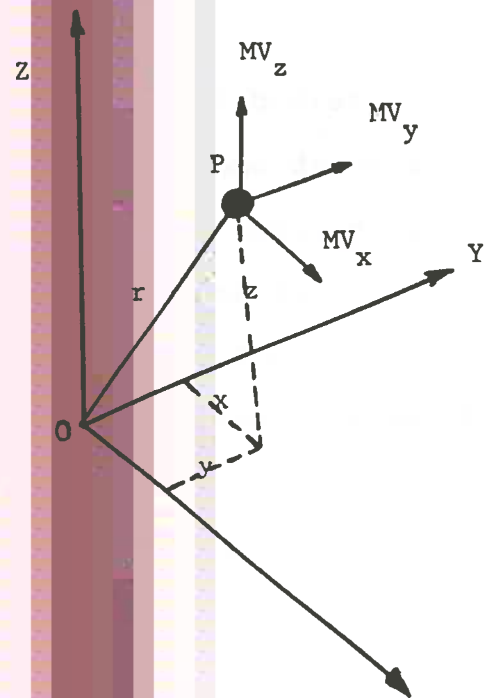

Z
MV z
MV y
P
MV x
Y
r
z
O
x
y

Fig. 8.3. Time dependent force during impact

during the restorati

definition of e toge

equation gives us

$$e = \frac{\int_{t_o}^{t} F_r dt}{\int_{o}^{t_o} F_d dt} = \frac{m_1(-V_1' - [-V_o])}{m_1(-V_o - [-V_1])} = \frac{V_o - V_1'}{V_1 - V_o} \tag{8.5}$$

Similarly for particle 2 we have

$$e = \frac{\int_{t_o}^{t} F_r dt}{\int_{o}^{t_o} F_d dt} = \frac{m_2(V_2' - V_o)}{m_2(V_o - V_2)} = \frac{V_2' - V_o}{V_o - V_2}$$

$$\Delta k = \frac{1}{2} \left(\frac{m_1 m_2}{m_1 + m_2}\right) (1 - e^2) (V_1 - V_2)^2 \qquad (8.7)$$

The energy loss vanishes for the impact of completely elastic bodies, when e = 1.

3. Impulse quantity

The total impulse delivered to either body 1 or 2 is the change in the momentum:

(8.8)

$$G = \frac{1 + e}{1 + \phi} M_L V_O = \frac{1 + e}{1 + \phi} G_{INIT} \qquad (8.10)$$

Fig. pp

$$\ddot{\alpha} = n\ M\ a^{3/2} \tag{8.18}$$

where

$$M = \frac{1}{m_1} + \frac{1}{m_2} \tag{8.19}$$

if both sides of (8.18) are multiplied by α and the resultant equation is integrated the following results:

$$(\dot{\alpha}^2 - v^2) = -\frac{4}{5}\ M\ n\ \alpha^{5/2} \tag{8.20}$$

(8.21)

$$\tfrac{1}{2} m_1 v_1^2 = \int_0^{\alpha_1} P\ d\ \alpha \tag{8.22}$$

It has been shown that the pressure distribution over the area of contact is

$$q_{x,y} = q_0 \left[1 - \frac{x^2}{a^2} - \frac{y^2}{a^2}\right]^{1/2} \tag{8.27}$$

$$\frac{x^2}{a^2} + \frac{y^2}{a^2} = 1 \tag{8.28}$$

and therefore

$$q_{x,y} = 0 \tag{8.29}$$

$$q_0 = \frac{3P}{2\pi a^2} \tag{8.30}$$

Combining Eqs. (8.24) , (8.26), (8.27), and (8.30) and introducing polar coordinates, the following equation is obtained for the magnitude and distribution of the surface pressure:

$$\left(\frac{5v^2}{4nM}\right)^{1/5} \left[1 - \left(\frac{r}{a}\right)^2\right]^{1/2} \tag{8.31}$$

with Eq. (8.21) and integrating

(8.35)

(8.36)

$$\alpha = \alpha_1 \sin \frac{\pi t}{t_o} \tag{8.37}$$

or, substituting Eq. (8.36) for t_o,

$$\alpha = \alpha_1 \sin \frac{\pi t v}{2.94 \alpha_1} \tag{8.38}$$

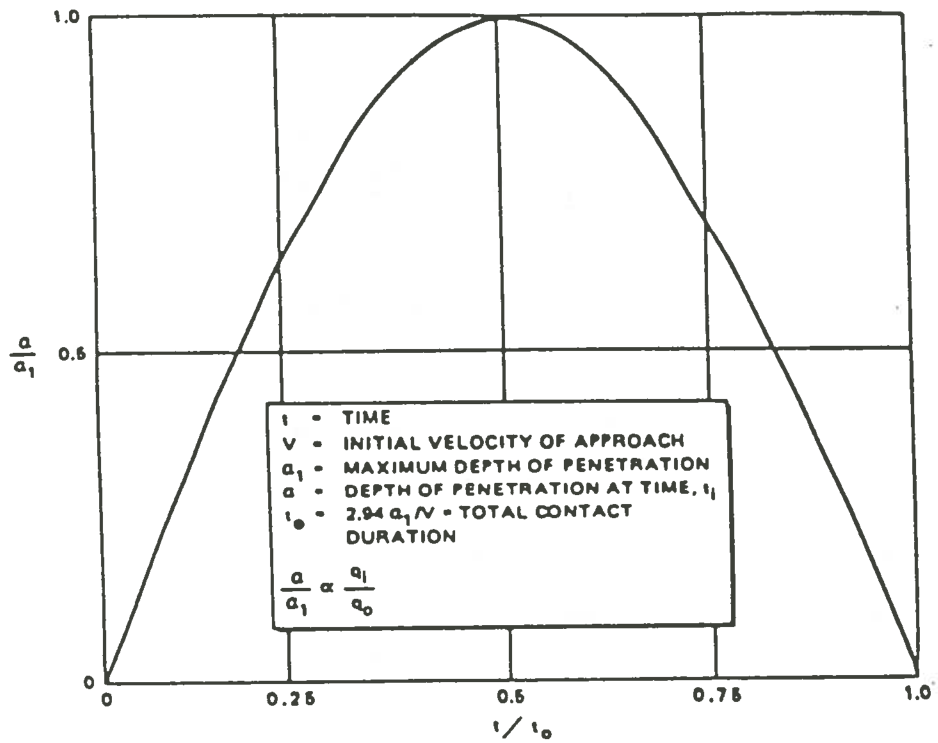


Fig. 8.5. Generalized pressure-time relationship for a particle impacting a target. (Per Zukas[27])

$$+ \,\mathrm{r}\, t^{-1} s-1) + \frac{3}{2(1+s^2)}] q_0(t)$$

...iques for the

The signal ...

the ...

... accelerometer

... ctively.

$$\Delta T_i = \tau A_i - \tau B_i$$

$$\overline{\Delta T} = \frac{1}{N} \sum_{i=1}^{N} \Delta T_i$$

τ_{Ai}, τ_{Bi} = impact time to the ith accelerometer from impact A and B, respectively.