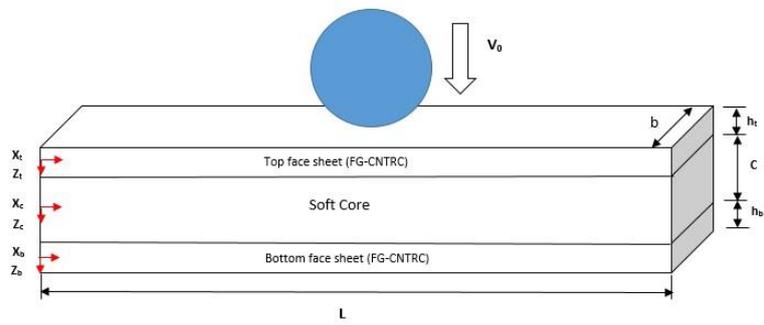

Pure and Applied Sciences

New Trends and Issues Proceedings on Advances in

* :

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$$i = t \quad b \quad x \quad z \quad \phi^i \quad u_0 \quad w_0$$

$$\sigma_{xx}^i = E_{11} \varepsilon_{xx}^i$$

$$\tau_{xz}^i = G_{13} \gamma_{xz}^i$$

E_{11}, G_{13}

2.2. Core

$$w^c(x, z, t) = w_0^c(x, t) + w_1^c(x, t)z_c + w_2^c(x, t)z_c^2$$

$$u^c(x, z, t) = u_0^c(x, t) + \varphi_0^c(x, t)z_c + u_2^c(x, t)z_c^2 + u_3^c(x, t)z_c^3$$

$$w_0(x, t) \quad u_0(x, t)$$

$$\varphi_0(x, t)$$

z

:

z

$$w^c(x, -\frac{c}{2}, t) = w^t(x, t)$$

$$u^c(x, -\frac{c}{2}, t) = u^t(x, t) + \frac{h_t}{2} \phi^t(x, t)$$

$$w^c(x, \frac{c}{2}, t) = w^b(x, t)$$

$$u^c(x, \frac{c}{2}, t) = u^b(x, t) - \frac{h_b}{2} \phi^b(x, t)$$

$$\begin{cases} \varepsilon_{xx}^c(x, z, t) = u_{,x}^c(x, z, t) \\ \gamma_{xz}^c(x, z, t) = u_{,z}^c(x, z, t) + w_{,x}^c(x, z, t) \\ \varepsilon_{zz}^c(x, z, t) = w_{,z}^c(x, z, t) \end{cases}$$

$$\begin{bmatrix} \sigma_{xx}^c \\ \sigma_{zz}^c \\ \tau_{xz}^c \end{bmatrix} = \begin{bmatrix} C_{11}^c & C_{13}^c & 0 \\ C_{13}^c & C_{33}^c & 0 \\ 0 & 0 & C_{55}^c \end{bmatrix} \begin{bmatrix} \varepsilon_{xx}^c \\ \varepsilon_{zz}^c \\ \gamma_{xz}^c \end{bmatrix}$$

$$C_{ij}^c \quad i, j$$

2.3. Governing equations

$$\Pi = U + T - W$$

U_c

U_f

$$U = U_f + U_c$$

$$U_f = \int_{V_f} \left(\int \sigma_{xx}^t d\varepsilon_{xx}^t + K_s \int \tau_{xz}^t d\gamma_{xz}^t \right) dv_t + \int_{V_b} \left(\int \sigma_{xx}^b d\varepsilon_{xx}^b + K_s \int \tau_{xz}^b d\gamma_{xz}^b \right) dv_b$$

$$U_c = \int_{V_c} \left(\int \sigma_{xx}^c d\varepsilon_{xx}^c + \int \sigma_{zz}^c d\varepsilon_{zz}^c + \int \tau_{xz}^c d\gamma_{xz}^c \right) dv_c$$

$V_t, V_b \quad V_c$

T_f

T_c

$$T_f = \int_{V_t} \left(\frac{1}{2} \rho_t \left((w_t(x, z, t))^2 + (w_t'(x, z, t))^2 \right) \right) dv_t + \int_{V_b} \left(\frac{1}{2} \rho_b \left((w_b(x, z, t))^2 + (w_b'(x, z, t))^2 \right) \right) dv_b$$

$$T_c = \int_{V_c} \left(\frac{1}{2} \rho_c \left((w_c(x, z, t))^2 + (w_c'(x, z, t))^2 \right) \right) dv_c$$

$$T_{imp} = \frac{1}{2} M_{imp} w_p^2$$

ρ_c

ρ_t

ρ_b

$$W = \frac{2}{5} K_{imp} (w_p - w_t(x_{imp}, t))^{5/2}$$

x_{imp}

K

et al.

$$K_i = \frac{4}{3} \sqrt{R} \left(\frac{1}{E_{33,imp}} + \frac{1-v_s^2}{E_s} \right)^{-1}$$

v_s E_s

$E_{33,imp}$

$$\frac{d}{dt} \left(\frac{\partial T_c}{\partial Q_j^i} \right) + \frac{d}{dt} \left(\frac{\partial T_f}{\partial Q_j^i} \right) + \frac{d}{dt} \left(\frac{\partial T_{imp}}{\partial Q_j^i} \right) + \frac{\partial U_c}{\partial Q_j^i} + \frac{\partial U_f}{\partial Q_j^i} + \frac{\partial W}{\partial Q_j^i} = 0$$

$$\{Q_j^i\} = \left\{ \begin{array}{l} \{U_{0j}^t\}, \{\Phi_j^t\}, \{W_{0j}^t\}, \{U_{0j}^b\}, \{\Phi_j^b\}, \{W_{0j}^b\}, \\ \{U_{0j}^c\}, \{\Phi_{0j}^c\}, \{W_{0j}^c\} \end{array} \right\}, j=1, \dots, M$$

$$[M] \{Q\} + [K] \{Q\} = \{F\}$$

$$M_{imp} w_p = F_{imp}$$

K

M

F

F_{imp}

$$F_{imp} = K_{imp} (w_p - R_\delta \sum_{j=1}^M W_{0j}^t P_j(\xi_{imp}))^{3/2}$$

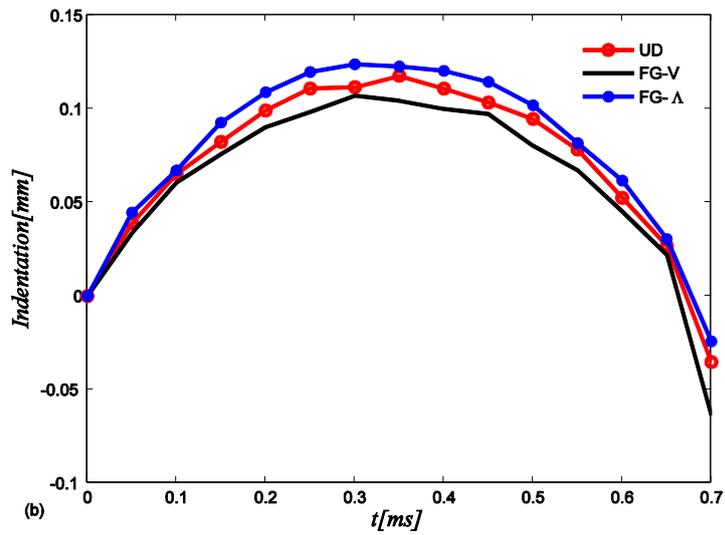
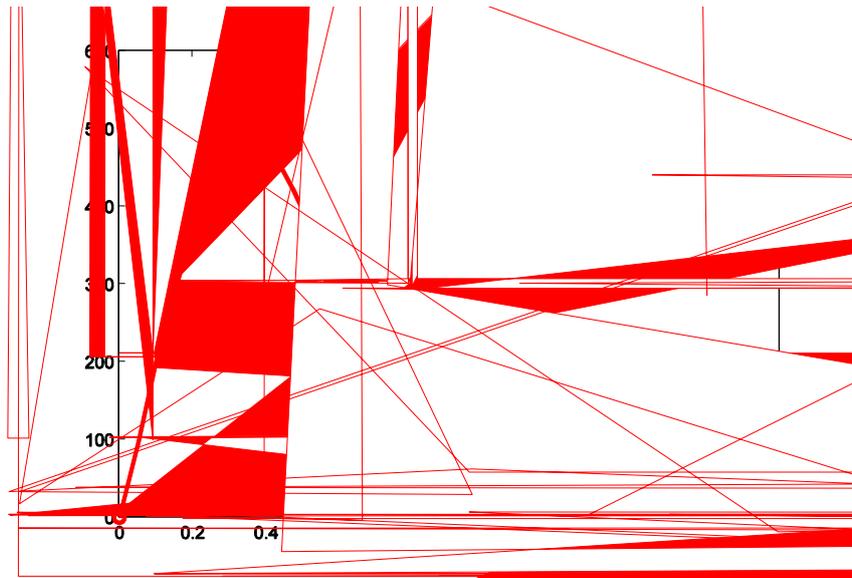
$$\xi_{imp} = \frac{2x_{imp}}{l}$$

E_{11}

G_{12}

3.1. Comparison study

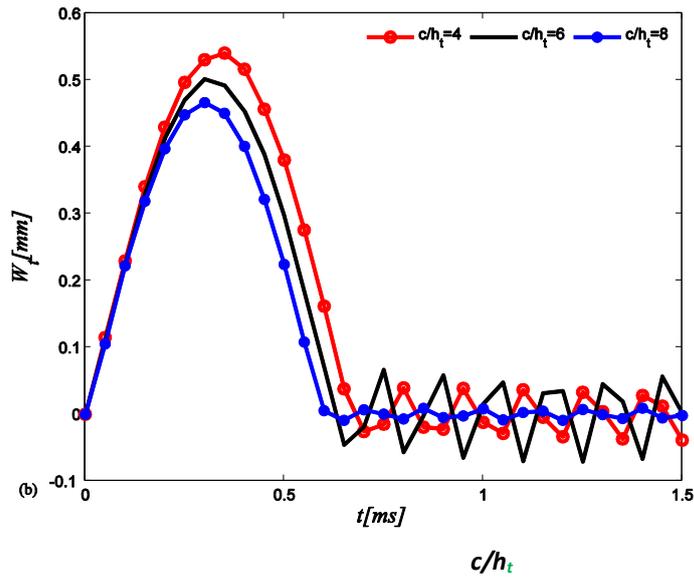
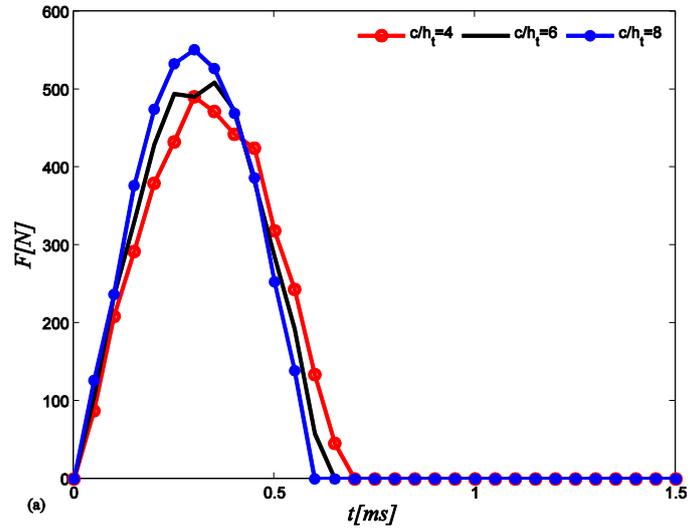
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3.2.2. Case II: Influence of the core-to-face sheet thickness ratio (c/h_t)

$$c/h_t$$

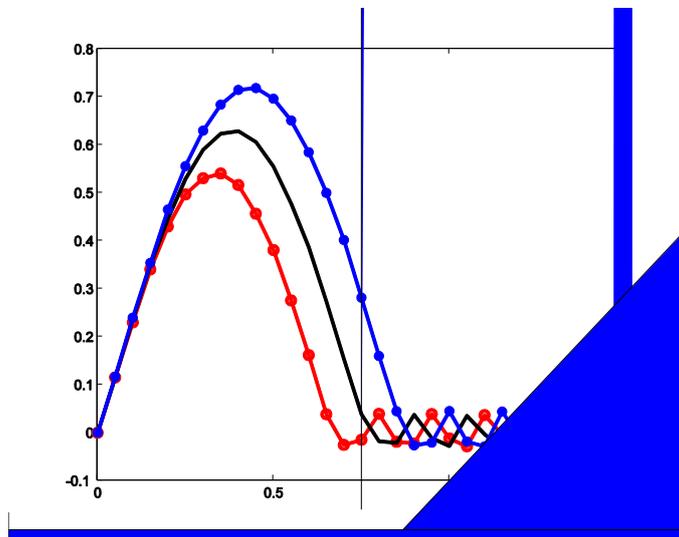
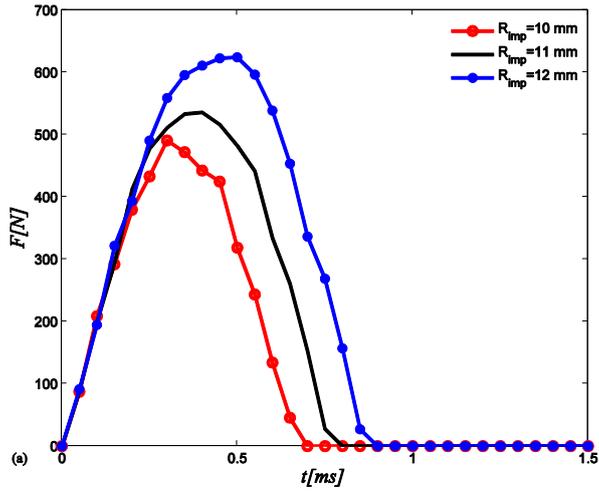
c/h_t



3.2.3. Case III: Influence of impactor's mass

V_{imp}

R_{imp}



-
-
-

c/h_t

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