

[Septembar 1998] UNUTRAŠNJA BALISTIKA
 [Juni 1998] (pismeni ispit) OPP - vežba
 (22.06.1998)

① U manometarskoj bombi $W_0 = 700 \text{ cm}^3$ sagoreva
 NC barut u obliku 19 kanalne kerolice dimenzija
 $D = 9,2 \text{ mm}$, $d = 0,64 \text{ mm}$, $L = 17,6 \text{ mm}$. $S_b = 1630 \text{ kg/s}$
 Pri sagorevanju 105 g baruta dobijeno je $P_{u1} = 1890 \text{ bar}$
 a pri sagorevanju 140 g baruta $P_{u2} = 2700 \text{ bar}$. Izračunati
 P_u u trenutku raspadanja barutnog zrna za sledeći
 sagorevanja 110 g baruta.

rešenje:

$$A_1 = \frac{w_1}{W_0} = \frac{105}{700} = 0,15 \text{ g/cm}^3; \quad A_2 = \frac{w_2}{W_0} = \frac{140}{700} = 0,2 \text{ g/cm}^3$$

$$\alpha = \frac{\frac{P_{u2}}{A_2} - \frac{P_{u1}}{A_1}}{P_{u2} - P_{u1}} = \frac{\frac{2700 \cdot 10^5}{0,2 \cdot 10^3} - \frac{1890 \cdot 10^5}{0,15 \cdot 10^3}}{2700 \cdot 10^5 - 1890 \cdot 10^5} = 1,11 \cdot 10^{-3} \frac{\text{cm}^3}{\text{kg}}$$

$$f = \frac{P_{u1}}{A_1} - \alpha P_{u1} = \frac{1890 \cdot 10^5}{0,15 \cdot 10^3} - 1,11 \cdot 10^{-3} \cdot 1890 \cdot 10^5$$

$$\boxed{f = 1050210 \text{ [N/kg]}}$$

$$\psi_{ez} = K(1 + \lambda + \mu)$$

$$\beta = \frac{2e_0}{L}$$

$$2e_0 = \frac{D - 5d}{6} = \frac{9,2 - 5 \cdot 0,64}{6}$$

$$\beta = \frac{1,0}{17,6} = 0,057$$

$$\boxed{2e_0 = 1,0 \text{ mm}}$$

$$\eta_1 = \frac{\pi(D + 19d)}{\pi L} = \frac{D + 19d}{L} = \frac{9,2 + 19 \cdot 0,64}{17,6} = 1,213$$

$$Q_1 = \frac{D^2 - 19d^2}{L^2} = \frac{9,2^2 - 19 \cdot 0,64^2}{17,6^2} = 0,248$$

$$K = \frac{2\eta_1 + Q_1}{Q_1} \beta = \frac{2 \cdot 1,213 + 0,248}{0,248} \cdot 0,057 = 0,615$$

$$\lambda = \frac{18 - 2\pi_1}{2\pi_1 + \alpha_1} \cdot \beta = \frac{18 - 2 \cdot 1,213}{2 \cdot 1,213 + 0,248} \cdot 0,057 = 0,332$$

$$\mu = - \frac{18}{2\pi_1 + \alpha_1} \beta^2 = - \frac{18}{2 \cdot 1,213 + 0,248} \cdot 0,057^2 = -0,022$$

$$\psi_{rt} = x(1 + \lambda + \mu) = 0,615(1 + 0,332 - 0,022) = 0,806$$

$$p_\psi = \frac{1050210 \cdot 0,110 \cdot 0,806}{700 \cdot 10^{-6} - \frac{0,110}{1630} - 0,110 \left(1110 \cdot 10^{-6} - \frac{1}{1630} \right) \cdot 0,806}$$

$$p_\psi = \frac{93111,62}{700 \cdot 10^{-6} - 67,48 \cdot 10^{-6} - 44,02 \cdot 10^{-6}}$$

$$p_\psi = 1582 \text{ bar}$$