PRESSÃO 1.0

BASE: ESTES TN-2 (1978), E. D. BROWN

DADOS: F, p_a, ε_e, D_t, γ

RESULTADO: p_c

EQUAÇÕES

(1) $$p_c = \frac{F}{C_F A_t}$$

(2) $$C_F = \left\{ \frac{2\gamma^2}{(\gamma-1)} \left(\frac{2}{\gamma+1}\right)^{(\gamma+1)/(\gamma-1)} \left[1 - \left(\frac{p_e}{p_c}\right)^{(\gamma-1)/\gamma}\right] \right\}^{1/2} + \frac{(p_e - p_a)}{p_c} \varepsilon_e$$

(3) $$\varepsilon_e = \frac{1}{M_e} \left\{ \frac{2}{(\gamma+1)} \left[1 + \frac{(\gamma-1)}{2} M_e^2\right] \right\}^{(\gamma+1)/2(\gamma-1)}$$

(4) $$p_e = p_c \, G^{\gamma/(1-\gamma)}$$

$$e_1 = \frac{\gamma}{(1-\gamma)}$$

(5) $$G = 1 + \frac{(\gamma-1)}{2} M_e^2$$

$$e_2 = \frac{\gamma+1}{\gamma-1}$$

(6) $$A_t = \frac{\pi D_t^2}{4}$$

$$e_3 = \frac{(\gamma-1)}{\gamma}$$

Exemplo: $F = 120$ N

TE-21 do Netuno-R

$p_a = 10^5$ Pa

$\varepsilon_c = 8{,}7 \longrightarrow M_e = 3{,}057$

$\gamma = 1{,}152$

$D_t = 11{,}4 \times 10^{-3}$ m $\rightarrow A_t = 1{,}02 \times 10^{-4}$ m^2

Tol$_p$ = 1 Pa $\rightarrow$ 49 iterações

Com $p_e = p_a$: $p_c \simeq 9{,}35$ bar ($\varepsilon_e = 2.26$) $\rightarrow$ [caso 2]

II $p_e \neq p_a$: $p_c \simeq 11{,}67$ bar (49 iterações) [caso 1]

$p_e = 0{,}20$ bar