Input :

① Thrust   F

② OD of grain   OD

③ ID of grain A_p

~~④ Area of the throat~~

④ Burn time T_B

⑤ Impulse. I

⑥ Chamber pressure . P_c

Paraffin N_2O

$OF = 8$

$Y = 1.25 = k$

$R = 332$

$T = 300 K$

$a = 0.155 \times 10^{-3}$

$n = 0.5$

1) Calculate $A_t = \dfrac{Force}{C_F \, P_c}$ $c^* = \sqrt{\dfrac{R \, T_o}{k} \left(\dfrac{1}{k \left(\frac{2}{k+1} \right)^{\frac{k+1}{k-1}}} \right)}$

2) Total $\dot{m} = \dfrac{g \, P_c \, A_t}{c^*}$

3) $P_n = \left[1 + \dfrac{1}{2} \sqrt{ \gamma \left(\dfrac{2}{\gamma+1} \right)^{\frac{\gamma+1}{\gamma-1}} \left(\dfrac{A_b}{A_p} \right)^2 } \right] P_c$

4) ① $OF = \dfrac{\dot{m}_o}{\dot{m}_f} = 8$

② $\dot{m} = \dot{m}_f (OF + 1)$

     $\dot{m}_f , \dot{m}_{or}$ find.

5) $\dot{r} = a \, G_{or}^{\,n}$

     $G_{ox} = \dfrac{\dot{m}_{ox}}{A_{port}}$

6) Burntime $= \left(\dfrac{OD - ID}{2} \right) \dfrac{1}{\dot{r}}$

$$7)\quad \dot{m}_{ox} = \sqrt{\frac{P_{FR} - P_H}{Z}}$$

$$\therefore\quad P_{FR} = \left(\dot{m}_{ox}^{2}\right)Z + P_H$$

$Z \rightarrow$ Resistance in oxidiser path
Flow (default $= 1$)

8) initialize time steps

a) Find impulse, specific impulse

→ Add throat erosion
→ Add instabilities.