Hugoniot Parameters

Initial Temp, Density, Specific Heat

T_o	ρ_o	C_v
(K)	$\left(\frac{kg}{m^3}\right)$	$\left(\frac{J}{kg \cdot K}\right)$
300	1806	1077

Hugoniot for Alpha-HMX

a	b
$\left(\frac{m}{s}\right)$	
3110	1.41

$$v_o := \frac{1}{\rho_o} = 553.71 \ \frac{cm^3}{kg}$$

Gruneisen Constant for beta-HMX γ

4.3

$$v1 := 450 \ \frac{cm^3}{kg} \qquad v2 := 500 \ \frac{cm^3}{kg} \qquad v3 := 550 \ \frac{cm^3}{kg}$$

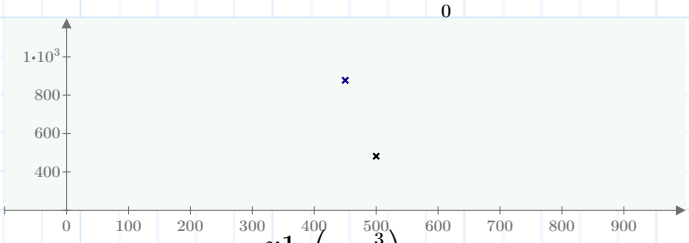
$$\eta1 := 1 - \frac{v1}{v_o} \qquad \eta2 := 1 - \frac{v2}{v_o} \qquad \eta3 := 1 - \frac{v3}{v_o}$$

$$\gamma1_o := \frac{\gamma \cdot v_o}{v1} \qquad \gamma2_o := \frac{\gamma \cdot v_o}{v2} \qquad \gamma3_o := \frac{\gamma \cdot v_o}{v3}$$

$$T_{H1} := T_o \cdot e^{\gamma1_o \cdot \eta1} + \frac{a^2 \cdot b \cdot e^{\gamma1_o \cdot \eta1}}{C_v} \cdot \int_0^{\eta1} \frac{\eta1^2}{(1 - b \cdot \eta1)^3} \cdot e^{-\gamma1_o \cdot \eta1} \, d\eta1 = 877.491 \ K$$

$$T_{H2} := T_o \cdot e^{\gamma2_o \cdot \eta2} + \frac{a^2 \cdot b \cdot e^{\gamma2_o \cdot \eta2}}{C_v} \cdot \int_0^{\eta2} \frac{\eta2^2}{(1 - b \cdot \eta2)^3} \cdot e^{-\gamma2_o \cdot \eta2} \, d\eta2 = 482.118 \ K$$

$$T_{H3} := T_o \cdot e^{\gamma3_o \cdot \eta3} + \frac{a^2 \cdot b \cdot e^{\gamma3_o \cdot \eta3}}{C_v} \cdot \int_0^{\eta3} \frac{\eta3^2}{(1 - b \cdot \eta3)^3} \cdot e^{-\gamma3_o \cdot \eta3} \, d\eta3 = 308.83 \ K$$

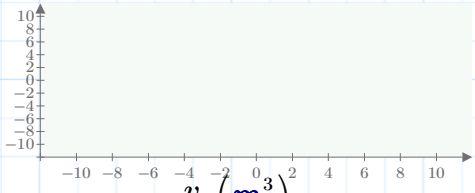


$v1 \ \left(\frac{cm^3}{kg}\right)$	$T_{H1} \ (K)$
$v2 \ \left(\frac{cm^3}{kg}\right)$	$T_{H2} \ (K)$
$v3 \ \left(\frac{cm^3}{kg}\right)$	$T_{H3} \ (K)$

$$v := 400\ \frac{cm^3}{kg}, 410\ \frac{cm^3}{kg} .. v_o$$

$$\eta(v) := 1 - \frac{v}{v_o} \qquad \gamma_o(v) := \frac{\gamma \cdot v_o}{v}$$

$$T_H(v) := T_o \cdot e^{\gamma_o(v)\cdot\eta(v)} + \frac{a^2 \cdot b \cdot e^{\gamma_o(v)\cdot\eta(v)}}{C_v} \cdot \int_0^{\eta(v)} \frac{\eta(v)^2}{(1 - b\cdot\eta(v))^3} \cdot e^{-\gamma_o(v)\cdot\eta(v)}\, d\eta$$



$T_H(v)$ (K)

v $\left(\frac{m^3}{kg}\right)$