①

$$(1)\quad \boxed{V\frac{d\rho_a}{dt} = -G_c + G_T} \qquad \rho_a(0)=\rho_0$$

$$(2)\quad \boxed{V\frac{d\rho_b}{dt} = G_c - G_T} \qquad \rho_b(0)=\rho_0$$

$$\rightarrow \frac{d}{dt}\left(\frac{\rho_a+\rho_b}{2}\right)=0 \rightarrow \boxed{\frac{\rho_a+\rho_b}{2} = \text{CONST} = \rho_0}$$

②

$$G_c\left[\left(h_{sc}+\frac{u_{sc}^2}{2}\right)-\underbrace{\left(h_{ec}+\frac{u_{ec}^2}{2}\right)}_{h_a}\right]=W \rightarrow G_c \, h_a\left[\left(\frac{p_b}{p_a}\right)^{\frac{\gamma-1}{\gamma}}-1\right]=W \rightarrow$$

$$h_a = \frac{\gamma}{\gamma-1}\frac{p_a}{\rho_a}$$

$$\boxed{G_c = \frac{\gamma-1}{\gamma}\frac{\rho_a}{p_a}W\left[\left(\frac{p_b}{p_a}\right)^{\frac{\gamma-1}{\gamma}}-1\right]^{-1}} \quad (3)$$

$$(4)\quad G_T = \begin{cases} \text{SI } 1<\dfrac{p_b}{p_a}<\left(\dfrac{\gamma+1}{2}\right)^{\gamma/\gamma-1}, & \boxed{G_T = \rho_b\sqrt{\gamma\dfrac{p_b}{\rho_b}}\,A\left(\dfrac{p_b}{p_a}\right)^{-\frac{\gamma+1}{2\gamma}}\left[\left(\dfrac{p_b}{p_a}\right)^{\frac{\gamma-1}{\gamma}}-1\right]^{1/2}\left(\dfrac{2}{\gamma-1}\right)^{1/2}} \\ \text{SI } \dfrac{p_b}{p_a}>\left(\dfrac{\gamma+1}{2}\right)^{\gamma/\gamma-1}, & \boxed{G_T = \rho_b\sqrt{\gamma\dfrac{p_b}{\rho_b}}\,A\left(\dfrac{\gamma+1}{2}\right)^{-\frac{\gamma+1}{2(\gamma-1)}}} \end{cases}$$

③

$$\boxed{\frac{V}{\gamma-1}\frac{d p_a}{dt} = -G_c\frac{\gamma}{\gamma-1}\frac{p_a}{\rho_a}+G_T\frac{\gamma}{\gamma-1}\frac{p_b}{\rho_b}} \qquad p_a(0)=p_0 \qquad (5)$$

$$\boxed{\frac{V}{\gamma-1}\frac{d p_b}{dt}} = \underbrace{G_c\left(h_{sc}+\frac{u_{sc}^2}{2}\right)}_{W+G_c h_a} - G_T\frac{\gamma}{\gamma-1}\frac{p_b}{\rho_b} = \boxed{G_c\frac{\gamma}{\gamma-1}\frac{p_a}{\rho_a}-G_T\frac{\gamma}{\gamma-1}\frac{p_b}{\rho_b}+W} \qquad p_b(0)=p_0 \qquad (6)$$

$$\frac{d}{dt}\left(\frac{p_a+p_b}{2}\right) = \frac{\gamma-1}{2}\frac{W}{V} \rightarrow \boxed{\frac{p_a+p_b}{2} = p_0+\frac{\gamma-1}{2}\frac{W}{V}t}$$

SI LA EVOLUCION EN LOS DEPOSITOS ES ISOTERMA

$$\frac{p_a}{\rho_a}=\frac{p_b}{\rho_b}=\frac{p_0}{\rho_0} \rightarrow \boxed{\frac{p_a+p_b}{2} = \frac{p_0}{\rho_0}\frac{\rho_a+\rho_b}{2} = p_0}$$

④

$$\frac{d}{dt}=0 \rightarrow G_c = G_T$$

→ TOBERA NO BLOQUEADA

$$\rightarrow \frac{\gamma-1}{\gamma}\frac{\rho_0}{p_0}W = \rho_b\sqrt{\gamma\frac{p_0}{\rho_0}}\,A\left(\frac{\rho_b}{2\rho_0-\rho_b}\right)^{-\frac{\gamma+1}{2\gamma}}\left[\left(\frac{\rho_b}{2\rho_0-\rho_b}\right)^{\frac{\gamma-1}{\gamma}}-1\right]^{3/2}\left(\frac{2}{\gamma-1}\right)^{1/2}$$

$$\boxed{\frac{\rho_b}{\rho_0}\left(\frac{\rho_b/\rho_0}{2-\rho_b/\rho_0}\right)^{-\frac{\gamma+1}{2\gamma}}\left[\left(\frac{\rho_b/\rho_0}{2-\rho_b/\rho_0}\right)^{\frac{\gamma-1}{\gamma}}-1\right]^{3/2} = \sqrt{\frac{\gamma-1}{2\gamma}\frac{\rho_0}{p_0}}\,\frac{\gamma-1}{\gamma}\frac{W}{p_0 A}}$$

→ TOBERA BLOQUEADA

$$\left[\left(\frac{\rho_b}{2\rho_0-\rho_b}\right)^{\frac{\gamma-1}{\gamma}}-1\right]^{-1}\frac{\gamma-1}{\gamma}\frac{\rho_0}{p_0}W = \rho_b\sqrt{\gamma\frac{p_0}{\rho_0}}\,A\left(\frac{\gamma+1}{2}\right)^{-\frac{\gamma+1}{2(\gamma-1)}} \rightarrow \boxed{\frac{\rho_b}{\rho_0}\left[\left(\frac{\rho_b/\rho_0}{2-\rho_b/\rho_0}\right)^{\frac{\gamma-1}{\gamma}}-1\right] = \frac{\gamma-1}{\gamma}\left(\frac{\gamma+1}{2}\right)^{\frac{\gamma+1}{2(\gamma-1)}}\frac{W}{p_0 A\sqrt{\gamma\frac{p_0}{\rho_0}}}}$$