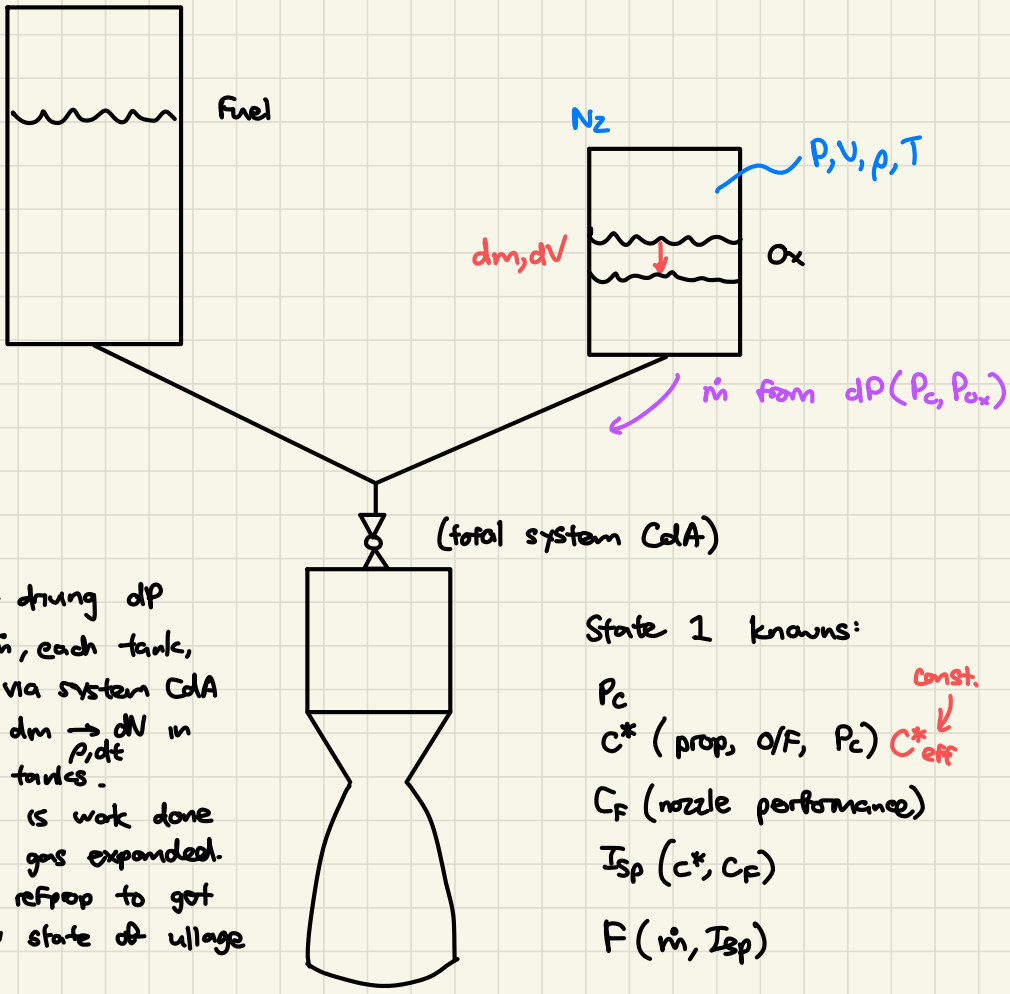

Steps:

① Get during dP
↳ ṁ, each tank, via system CdA

② Get $dm \xrightarrow{\rho, dt} dV$ in the tanks.

③ This is work done since gas expanded. Use refprop to get new state of ullage

State 1 knowns:

P_c

c^* (prop, O/F, P_c) C^*_{eff} (const.)

C_F (nozzle performance)

I_{sp} (c^*, C_F)

$F(\dot{m}, I_{sp})$

③ [Expanded:]

→ Assume adiabatic ($\delta Q = 0$)

→ for each timestep, work done = $p\,dV$

↳ In reality, ${}_1W_2^{\rightarrow} = \int_1^2 p\,dV$, and both p and V change during expansion, but we'll assume p is const across dt

→ $e_2 - e_1 = {}_1q_2^{\leftarrow} - {}_1W_2^{\rightarrow}$ (careful with signs, e should decrease)

→ Get new state from REFPROP via this new internal energy e and the new density ρ

④ Our tanks are now fully modeled to next timestep, and we have:

→ Total $\dot{m}$ of propellants

→ O/F ratio from each $\dot{m}$

⑤ Propellants reach engine with these new params. Need to derive new engine state (P_c and F_{thrust}) from this system:

	Total unknowns
$C^*_{real} = c^*(\text{prop combo}, O/F, P_c) \times C^*_{eff}$	2
$C_F = F/(A_t P_c)$	3
$F = \dot{m} c = \dot{m} C^*_{real} C_F$	3