4) core mass flux eqn.

$$\dot{m}_c = \frac{\Gamma}{\sqrt{R}} \frac{\pi_f \pi_c \pi_r}{\sqrt{T_f T_x}} \frac{P_0}{\sqrt{T_0}} A_8 \qquad (4)$$

π_f, T_f, π_r and A_8 are known

so (4) is

$$F_4(\dot{m}_c, \pi_c, T_x) = 0 \qquad (4)$$

(1) - (4) are 4 eqns with unknowns π_c, $\pi_{c'}$, T_x, α and $\dot{m}_c$ = 5 unknowns

⇒ need an additional eqn. (not obvious). Really need compressor and fan maps in order to know how π_c is related to $\pi_{c'}$ as engine rpm changes, i.e. to close the system, need

$$\pi_{c'} = \pi_{c'}(\pi_c)$$

parameterized by rpm.

⇒ soln. for π_c, $\pi_{c'}$, T_x, α + $\dot{m}_c$

$$\dot{m}_c + \dot{m}_f = \frac{\Gamma}{\sqrt{R}} \frac{P_0}{\sqrt{T_0}} \underbrace{\left\{ \frac{\pi_f \pi_c \pi_r}{\sqrt{T_f T_r}} + \frac{\pi_{c'} \pi_r}{\sqrt{T_{c'} T_r}} \frac{A_{8'}}{A_8} \right\}}_{\text{all known}} A_8$$