ideal constant area mixer has

inputs:

$$\frac{P_{t3'}}{P_{t5}} \rightarrow \frac{P_{t3}}{P_{tR}} \qquad \frac{T_{t3'}}{T_{t5}} \rightarrow \frac{T_{t3}}{T_{tR}}$$

$$M_5 \rightarrow M_R \qquad \alpha = \frac{\dot{m}_{3'}}{\dot{m}_5} \rightarrow \frac{\dot{m} + \dot{m}_f}{\dot{m}_R}$$

note:

$$\alpha = \frac{\dot{m}}{\dot{m}_R} + \frac{\dot{m}_f}{\dot{m}_R} = \frac{1}{\beta} + \frac{\dot{m}_f}{\dot{m}} \frac{\dot{m}}{\dot{m}_R} = \frac{1}{\beta} + \frac{\dot{m}_f}{\dot{m}} \frac{1}{\beta}$$

neg

$$\alpha = \frac{1}{\beta}$$

for ideal case going from R to nozzle exit implies no change in P_t & T_t

Note that assuming $M_5 = 0 \Rightarrow$ trivial soln for mixer problem. So have to expand flow through nozzle

output

$$M_7 \rightarrow M_4 \qquad \frac{P_{t7}}{P_{t5}} \rightarrow \frac{P_{t4}}{P_{tR}}$$