Turbo-jet with Afterburning Computer Assignment.

For all parts assume Twin-Spool Turbojet with Flight conditions, design parameters, and efficiencies all the same as the class examples (unless noted otherwise below).

For the afterburner: $(\Delta P_0)_b^{AB} = (\Delta P_0)_b^{cc} = 4\%$ of delivery

$\eta_b^{AB} = \eta_b^{cc} = 0.98$

Part 1: Effect of afterburner temperature ($TEMPAB = T_{07}$) on F_s & tsfc at cruise.

Recall class example without afterburning:

$F_s^{NOAB} = 535.841$

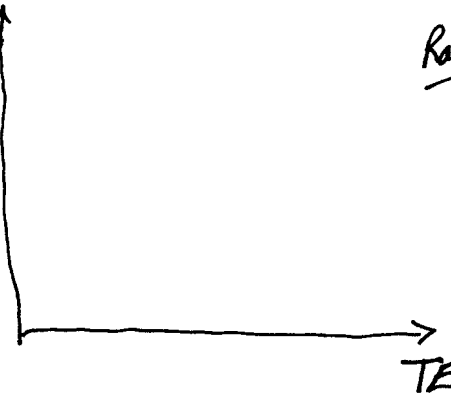
$tsfc^{NOAB} = 0.112984$

Compute F_s & tsfc, with afterburning, for the following afterburner temperatures:

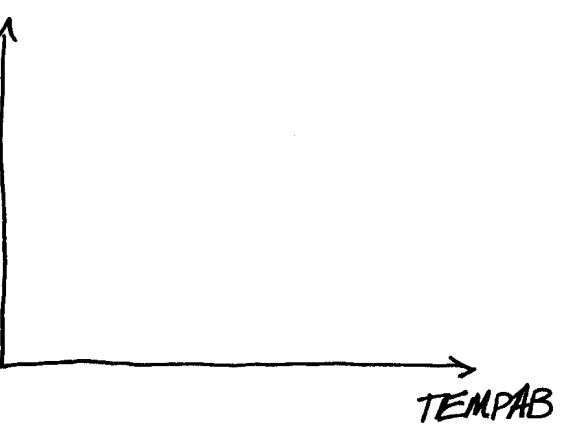
TEMPAB = 1200K to 2000K, inclusive, in increments of 100K

Plot:

Ratio: $\frac{F_s^{AB}}{F_s^{NOAB}}$



Ratio: $\frac{tsfc^{AB}}{tsfc^{NOAB}}$



Part 2: Effect of Afterburning on Take-off Thrust (at sea level)

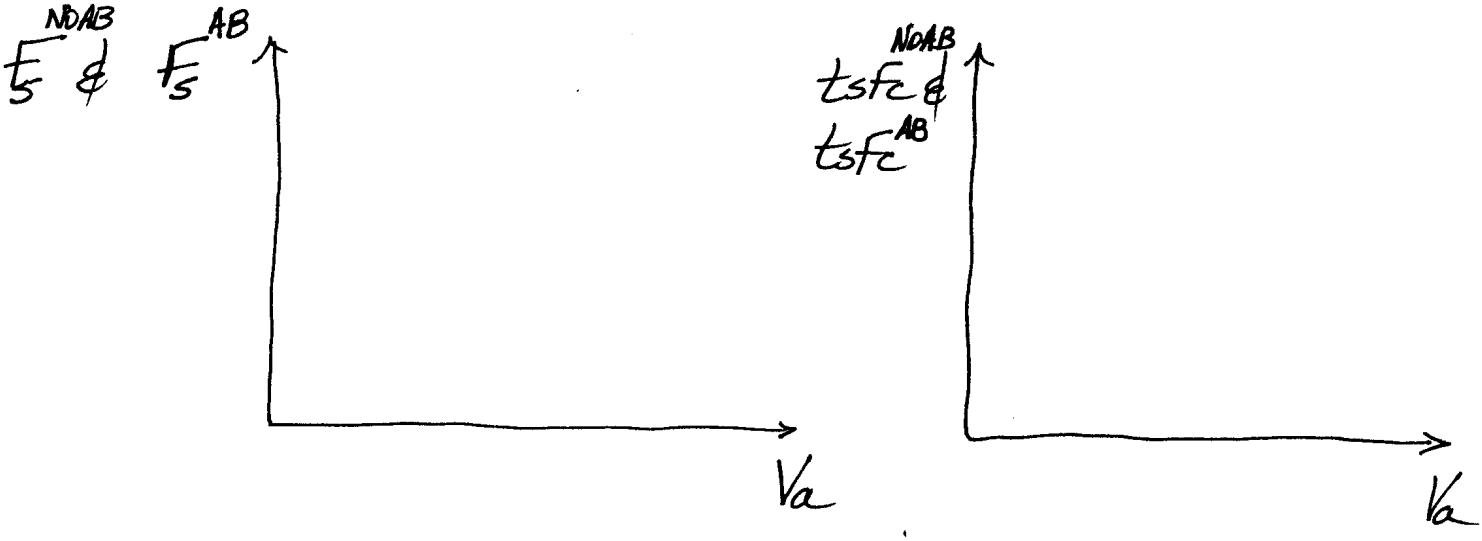
Assume an altitude of OKM → $T_a = 288.2\ K$, $P_a = 101.3\ kPa$

Assume a fixed afterburner temperature TEMPAB = $T_{07} = 2000\ K$ (given).

All else is the same as Part 1 (except V_a as noted below) Compute F_s and tsfc, both with and without afterburning, for various flight speeds, V_a, as follows.

V_a = 0 (take-off) to 300 m/sec, in increments of 50 m/sec.

Plot:



Tabulate all results in Parts 1 & 2 so that I can "spot-check" them.

Discuss all results briefly.