

Teamwork assignment (maximum 4 people)

Deadline: N/A

PART 1

Assume your team must perform the parametric design of a turbofan engine to power a commercial airliner. The following is requested:

- Choose a model of airplane powered by turbofan engines, and find as much information as possible of its engines, for a particular cruise flight condition.
- Use the equations to solve the turbofan engine, and determine the specific thrust, and the specific fuel consumption.
- Analyze and plot the sensibility of F/\dot{m} and I_{sp} to small variations of each parameter in a range about its nominal value, keeping constant the rest of them.
- According to the results of question 2), select a new set of values for α , π_{LPC} , π_{IPC} , π_{HPC} , and compute the variation of F/\dot{m} and I_{sp} .

Remark: if no better information is available, use the efficiencies below.

For two-spool turbofan:

π_d	η_f	η_{LPC}	η_{HPC}	π_b	η_b	η_{HPT}	η_{LPT}	η_{mH}	η_{mL}	π_{np}	π_{ns}
0.98	0.89	0.88	0.89	0.96	0.99	0.91	0.93	0.993	0.997	0.99	0.99

For three-spool turbofan (Rolls-Royce configuration, where LPC refers to fan):

π_d	η_{LPC}	η_{IPC}	η_{HPC}	π_b	η_b	η_{HPT}	η_{IPT}	η_{LPT}	η_{mH}	η_{mI}	η_{mL}	π_{np}	π_{ns}
0.98	0.89	0.88	0.89	0.96	0.99	0.91	0.91	0.93	0.993	0.995	0.997	0.99	0.99