

### Ideal Nozzle Simulation Inputs:

a: 0.05 meter \*\* 2 / kilogram

n: 0.65

m: -0.2

### Oxidiser:

Initial Volume: 0.41 liter

Initial Mass: 0.7 lbs

Injector Mass Flow Rate: 0.042 kilogram / second

Number of Injectors: 1

Ideal O/F Ratio: 4.83

External Temp: 65 degF

Time Step: 0.001 second

### Simulation Results:

Total Burn Time: 7.561 second

Impulse: 1178.37 newton \* second

Average Thrust: 155.85 newton

Motor: J156

### Nozzle Results:

Suggested Throat Diameter: 0.209 inch

Suggested Exit Diameter: 0.474 inch

Suggested Diffuser Length: 0.495 inch

### Fuel Grain

Port Length: 13.4 inch

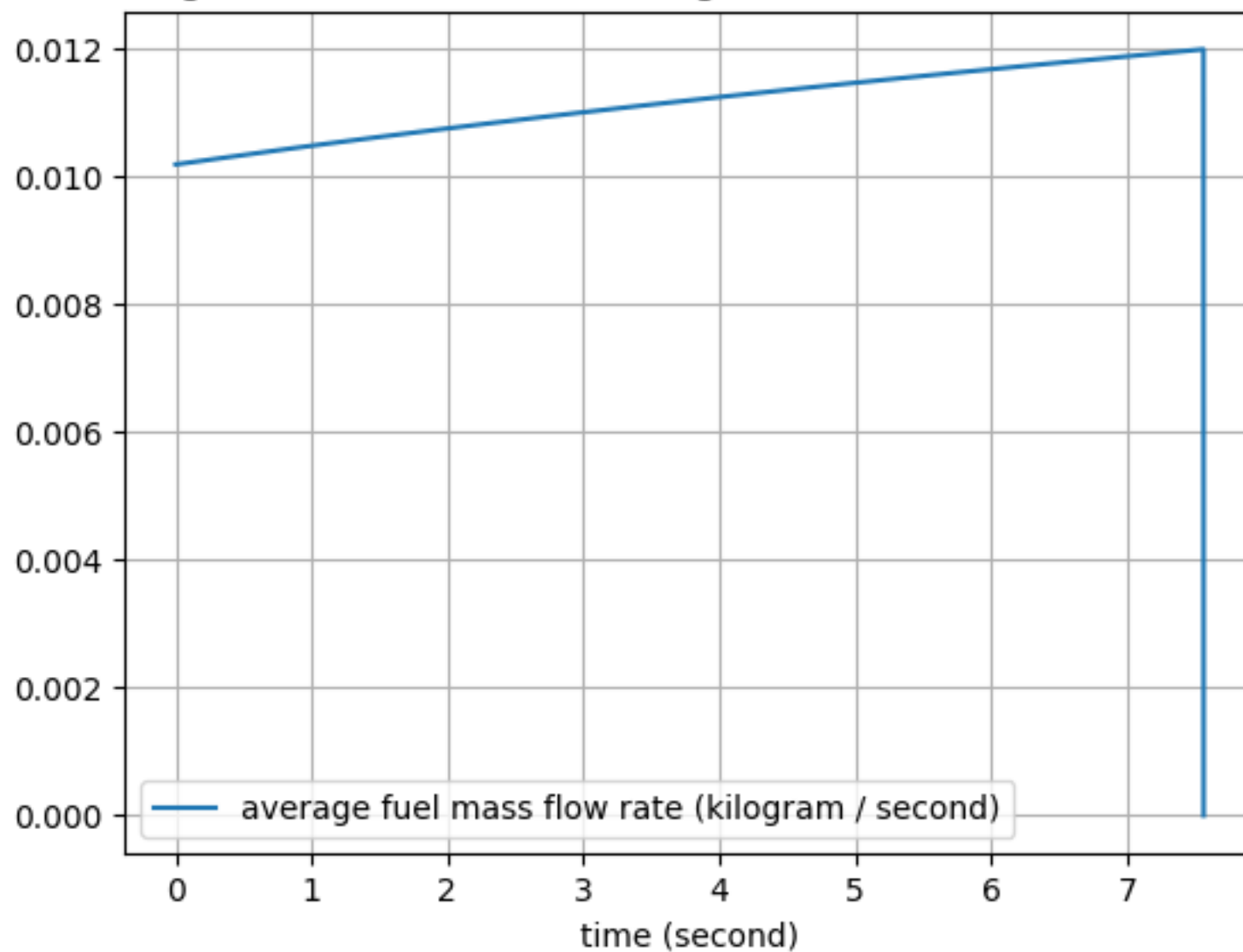
Fuel Density: 3.96 kilogram / meter \*\* 3

Grain Diameter: 1.75 inch

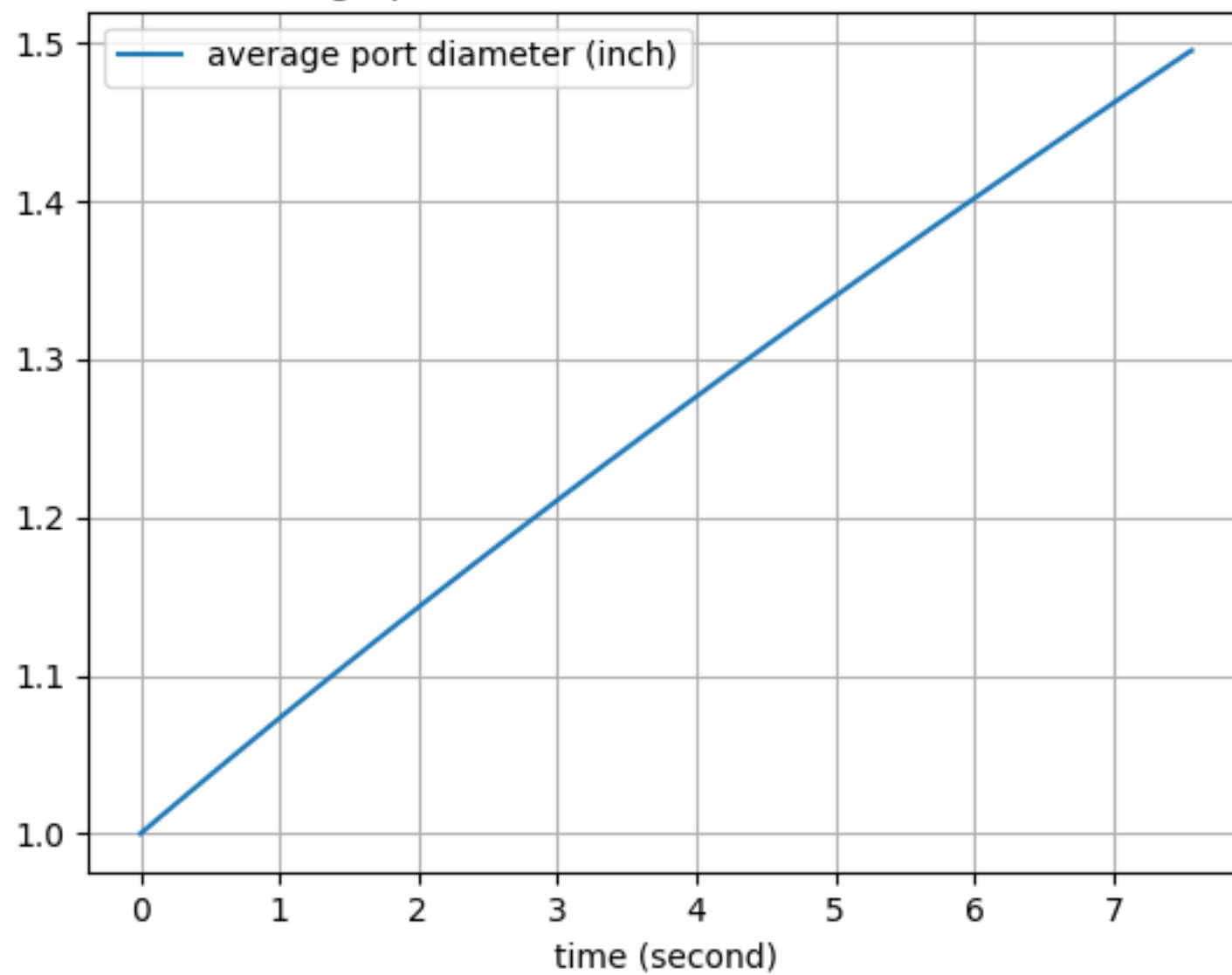
Initial Port Diameter: 1.0 inch

Final Port Diameter: 1.496 inch

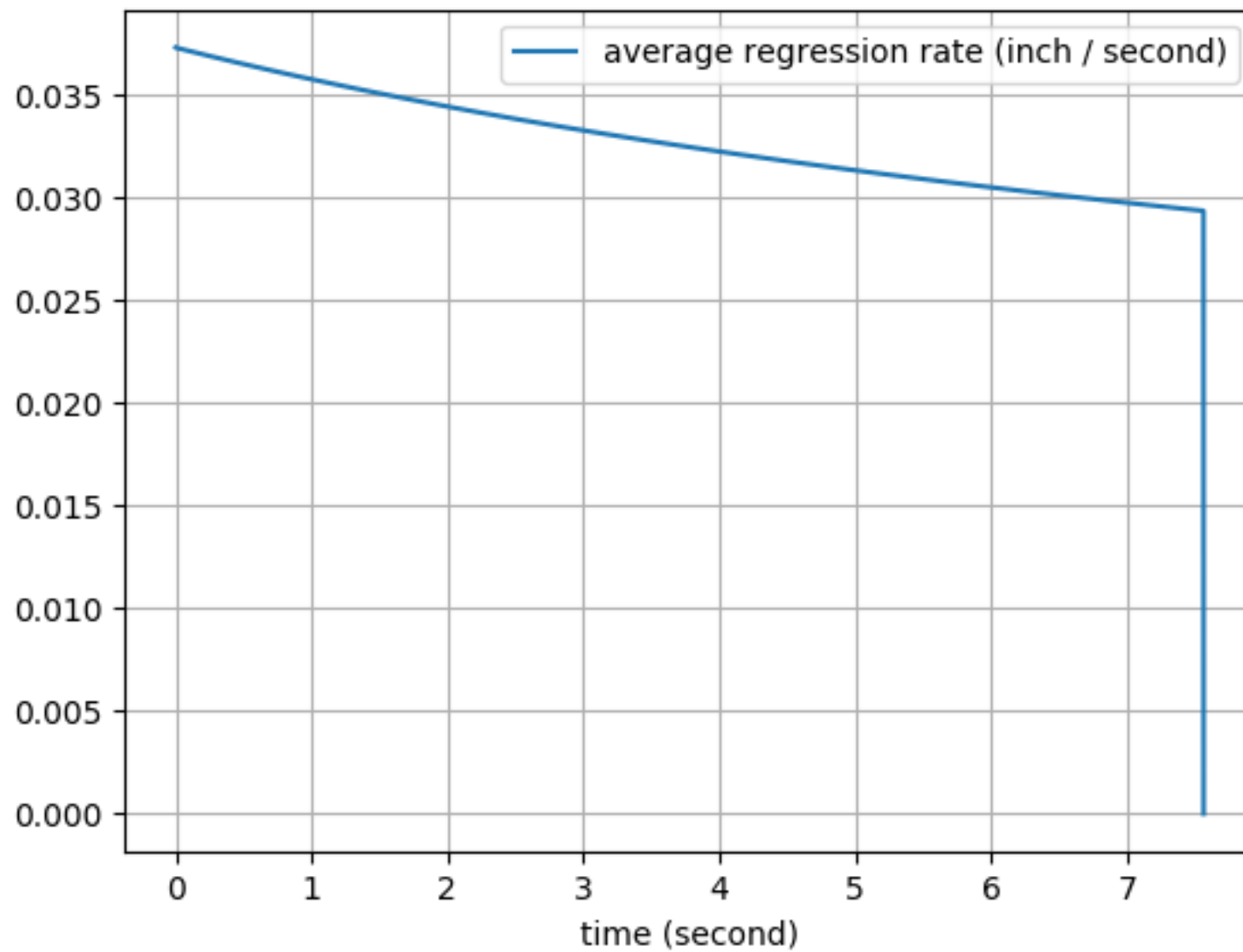
average fuel mass flow rate (kilogram / second) vs time (second)



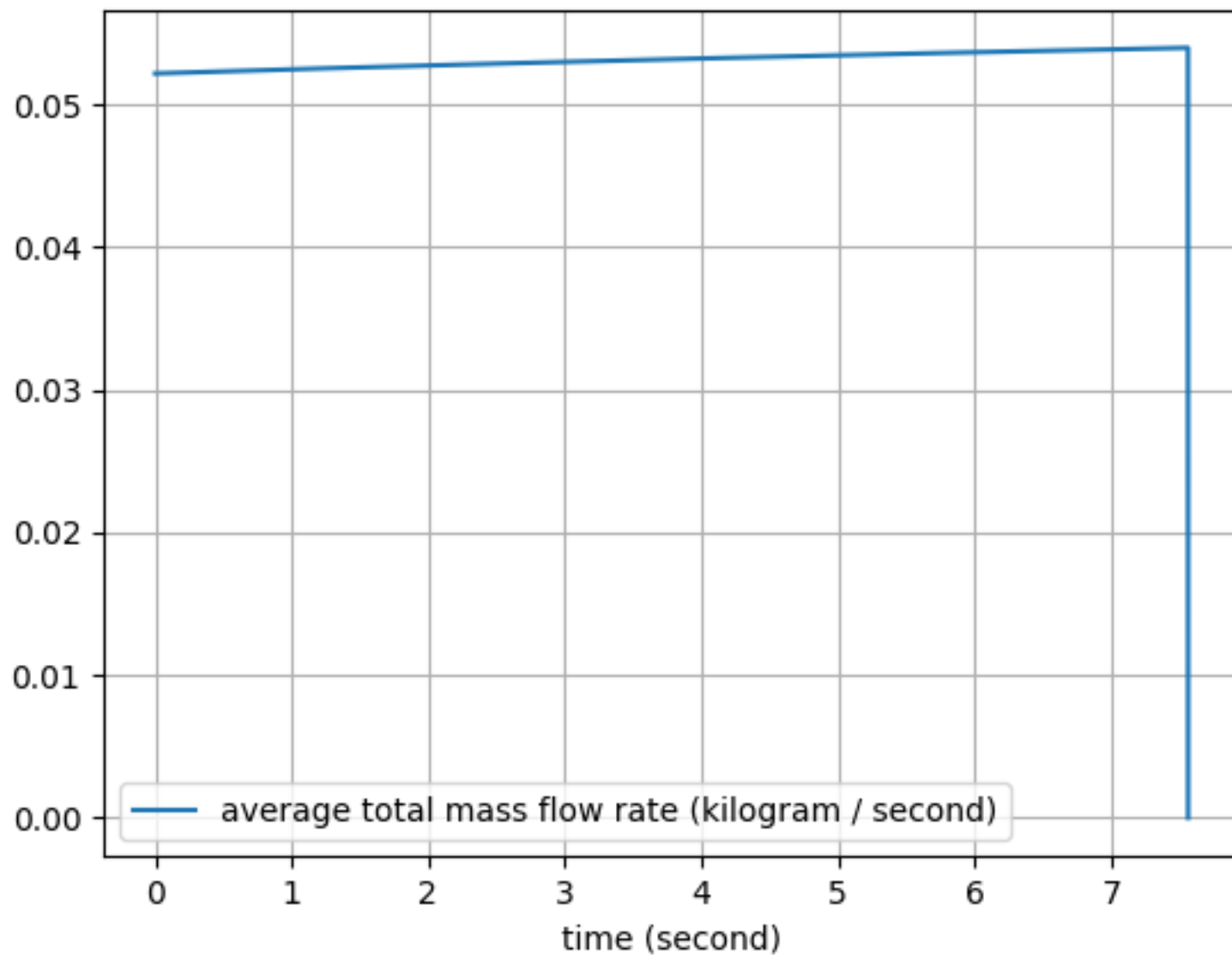
average port diameter (inch) vs time (second)



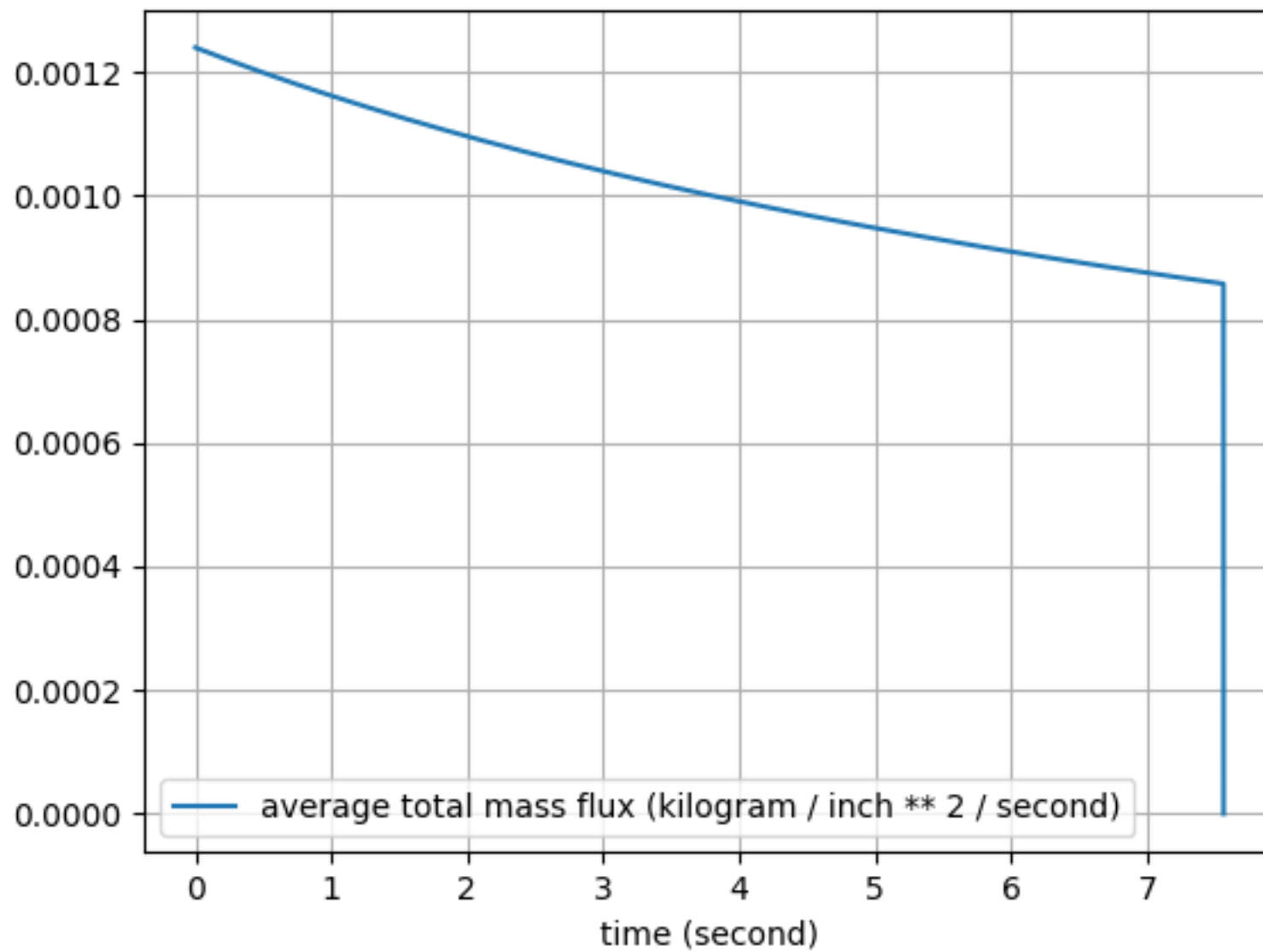
average regression rate (inch / second) vs time (second)



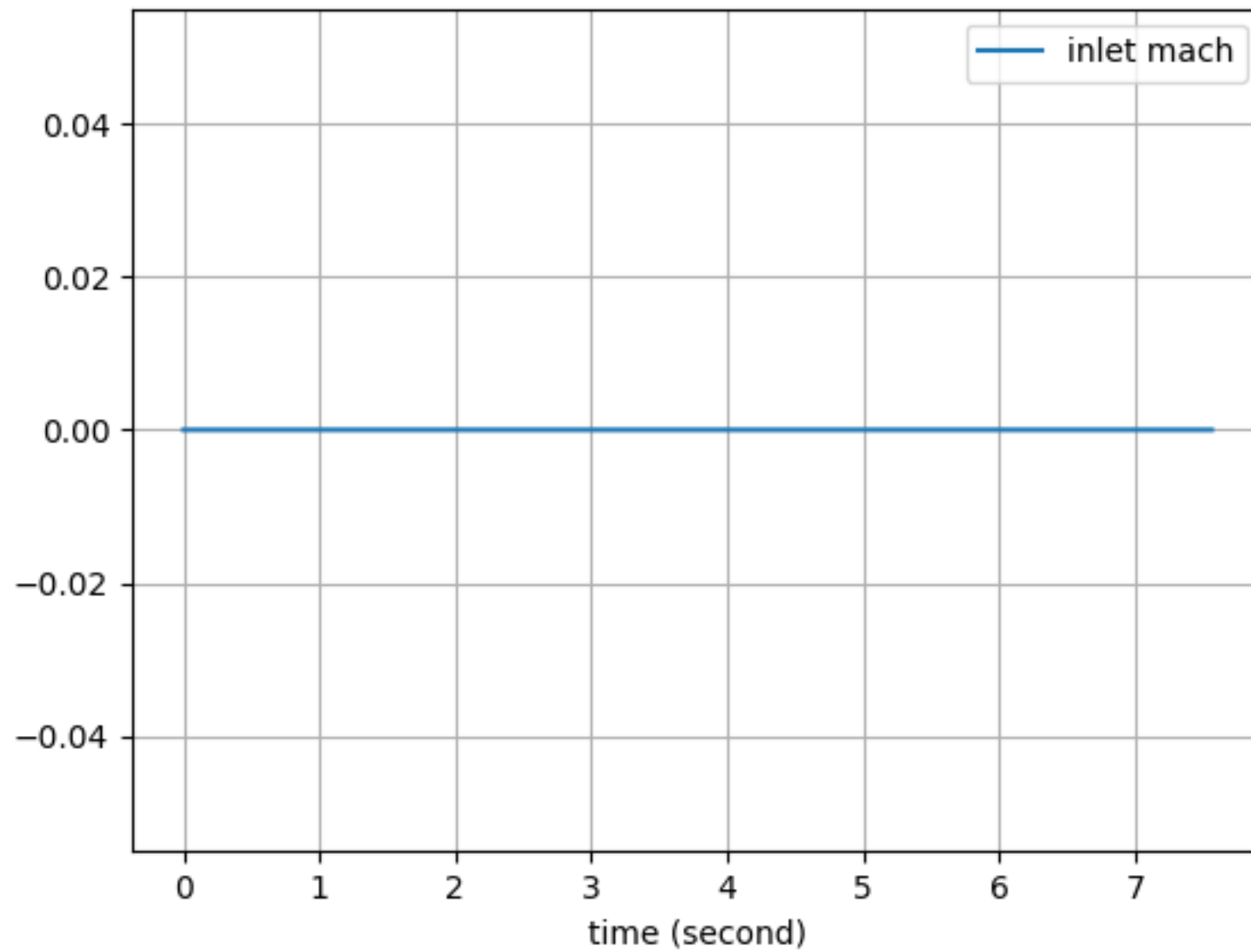
average total mass flow rate (kilogram / second) vs time (second)



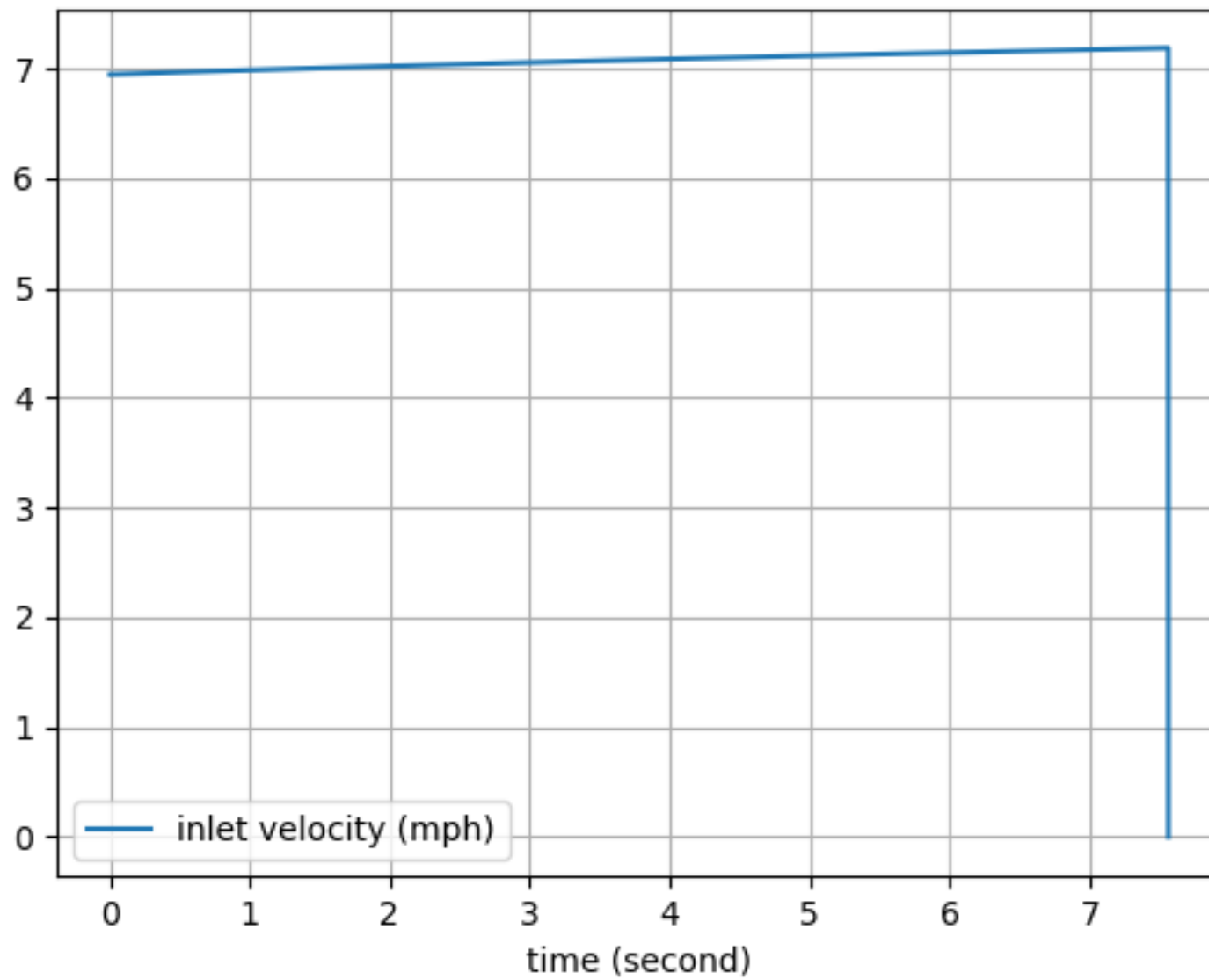
average total mass flux (kilogram / inch \*\* 2 / second) vs time (second)



inlet mach vs time (second)

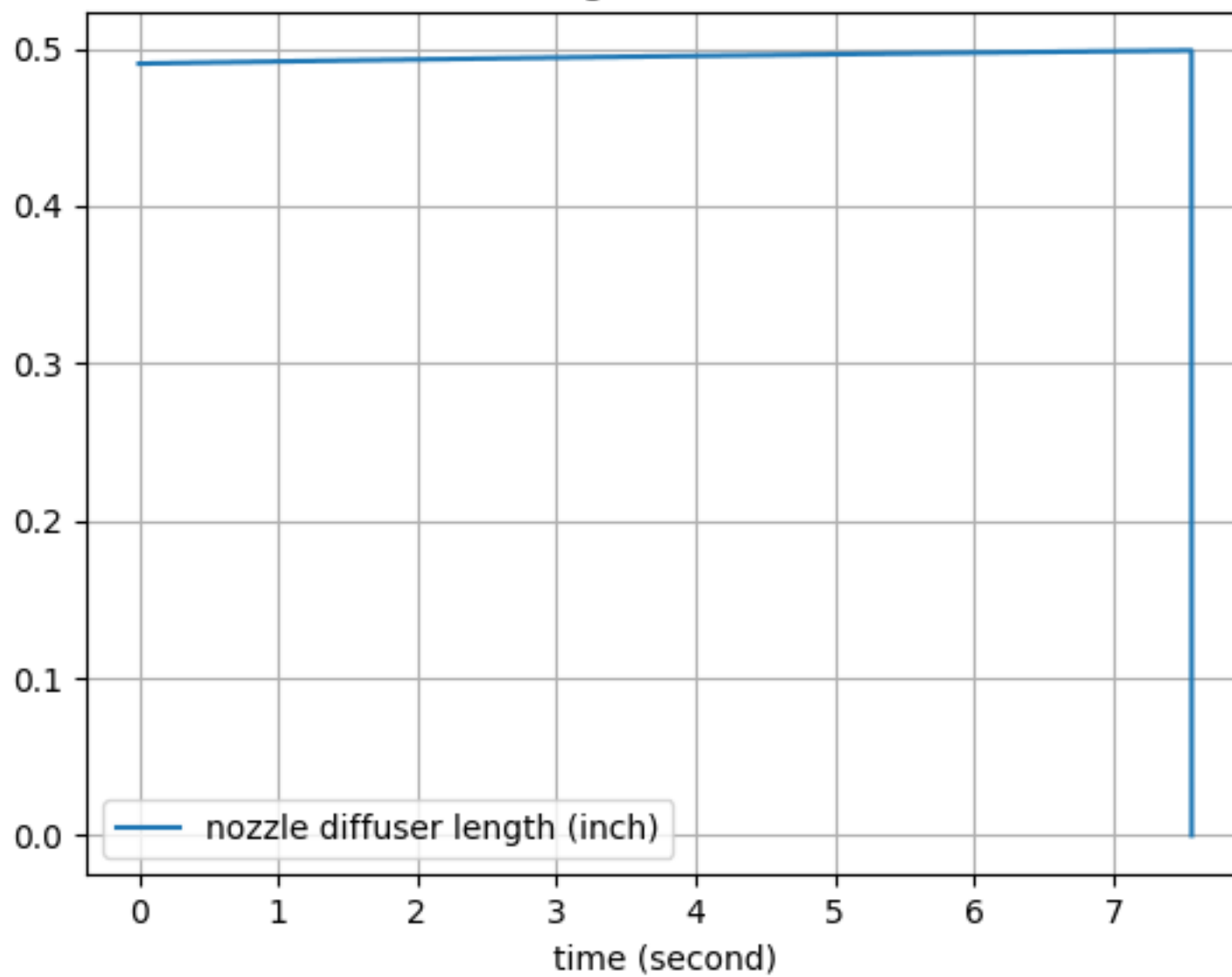


inlet velocity (mph) vs time (second)

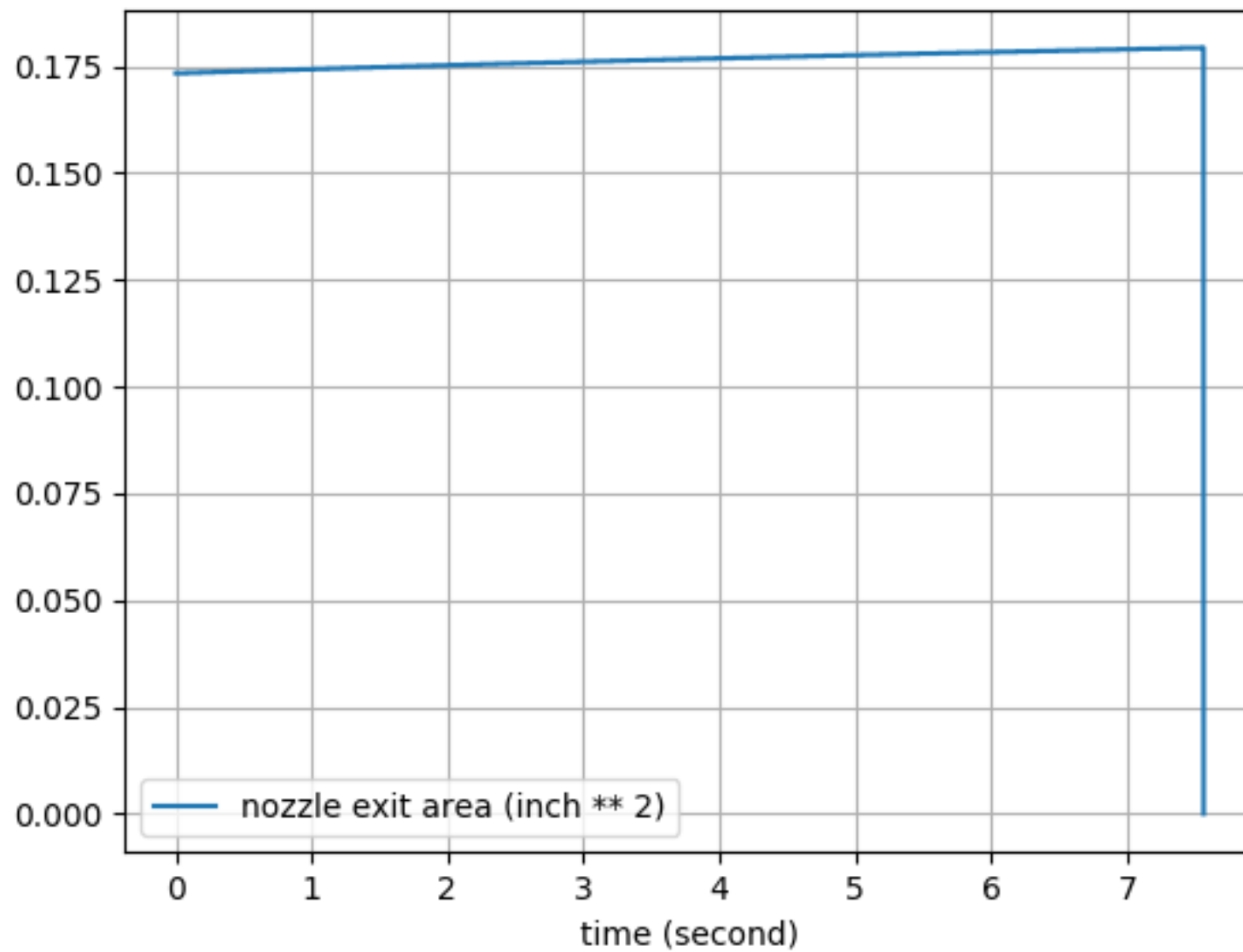


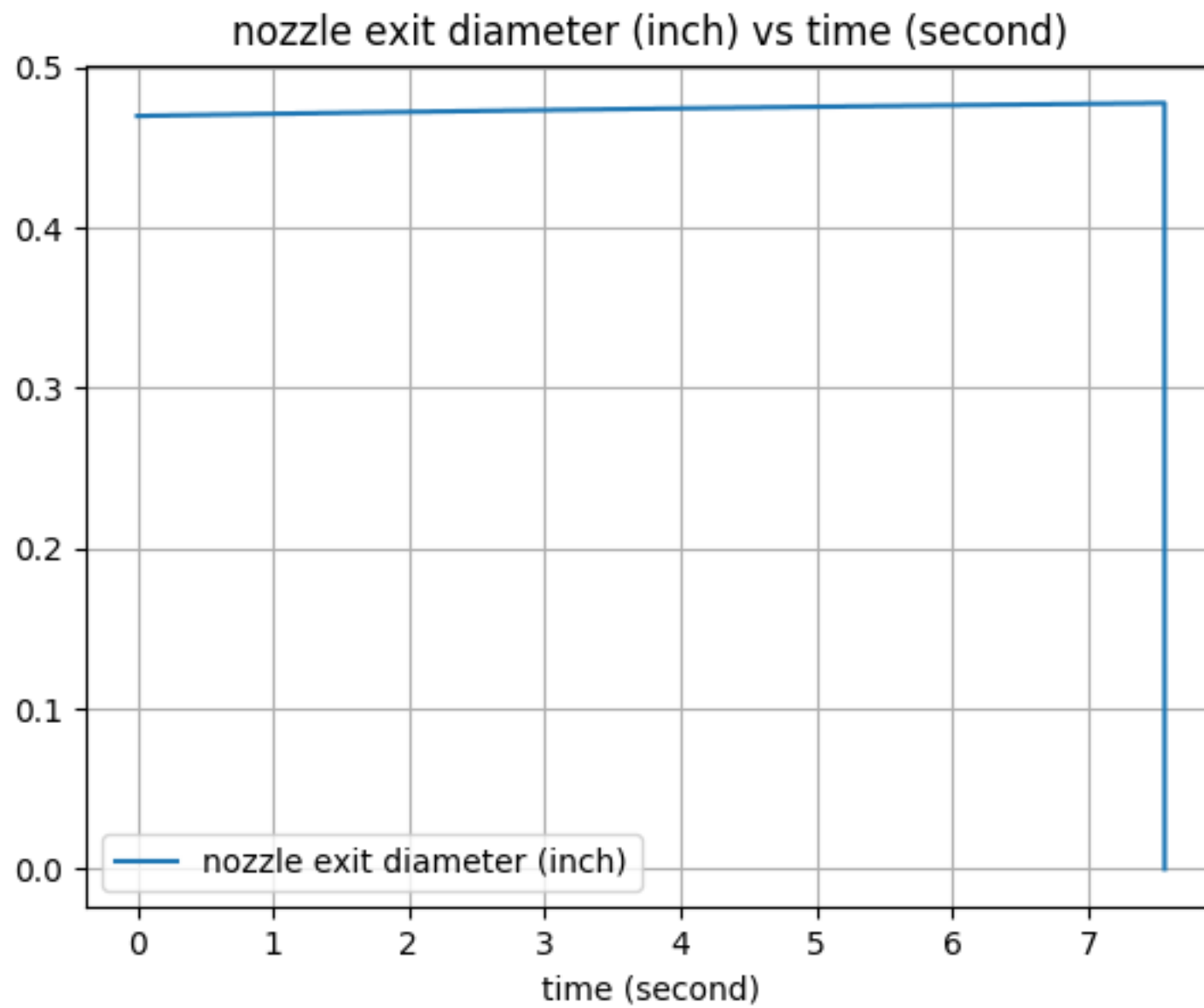


nozzle diffuser length (inch) vs time (second)

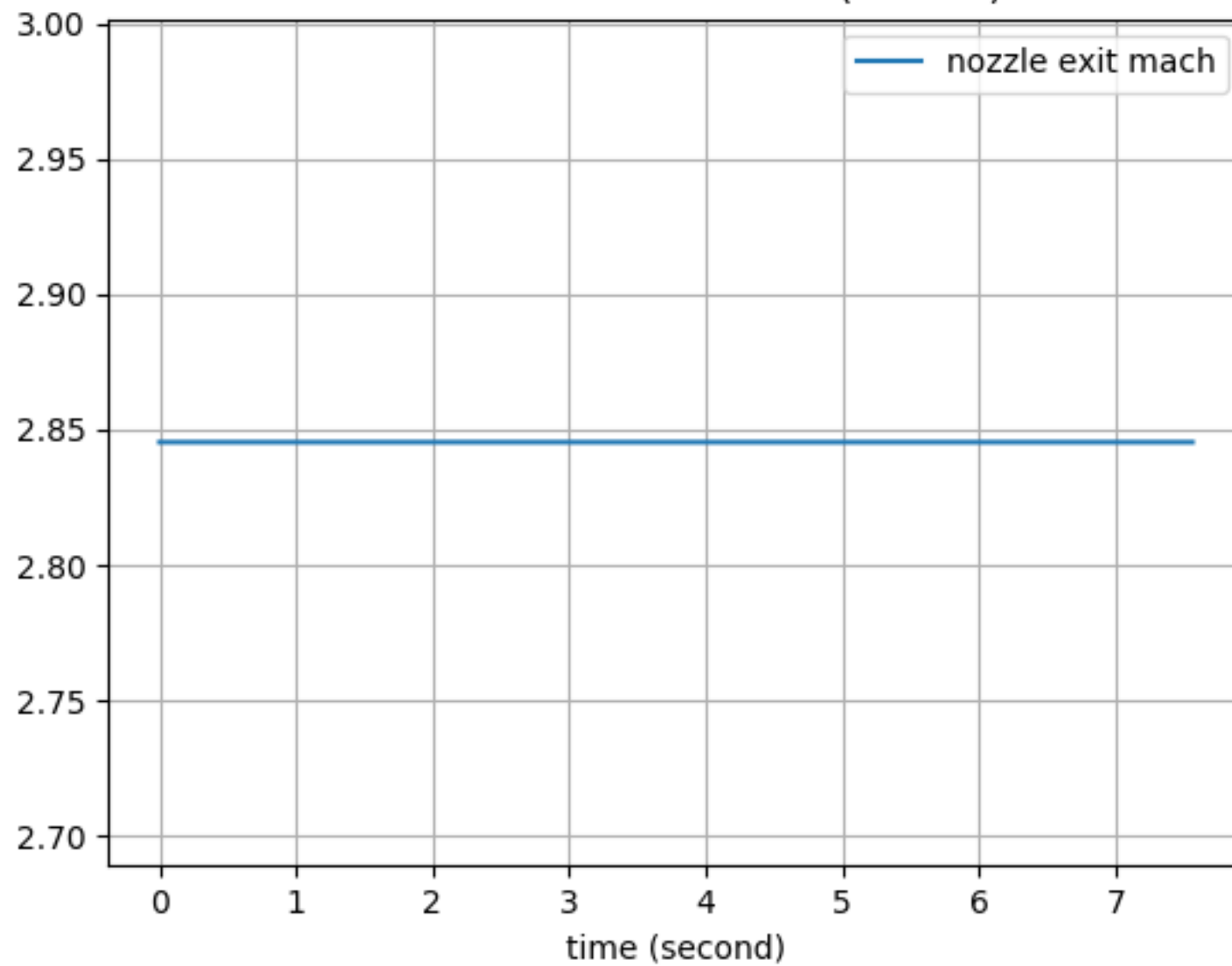


nozzle exit area (inch \*\* 2) vs time (second)

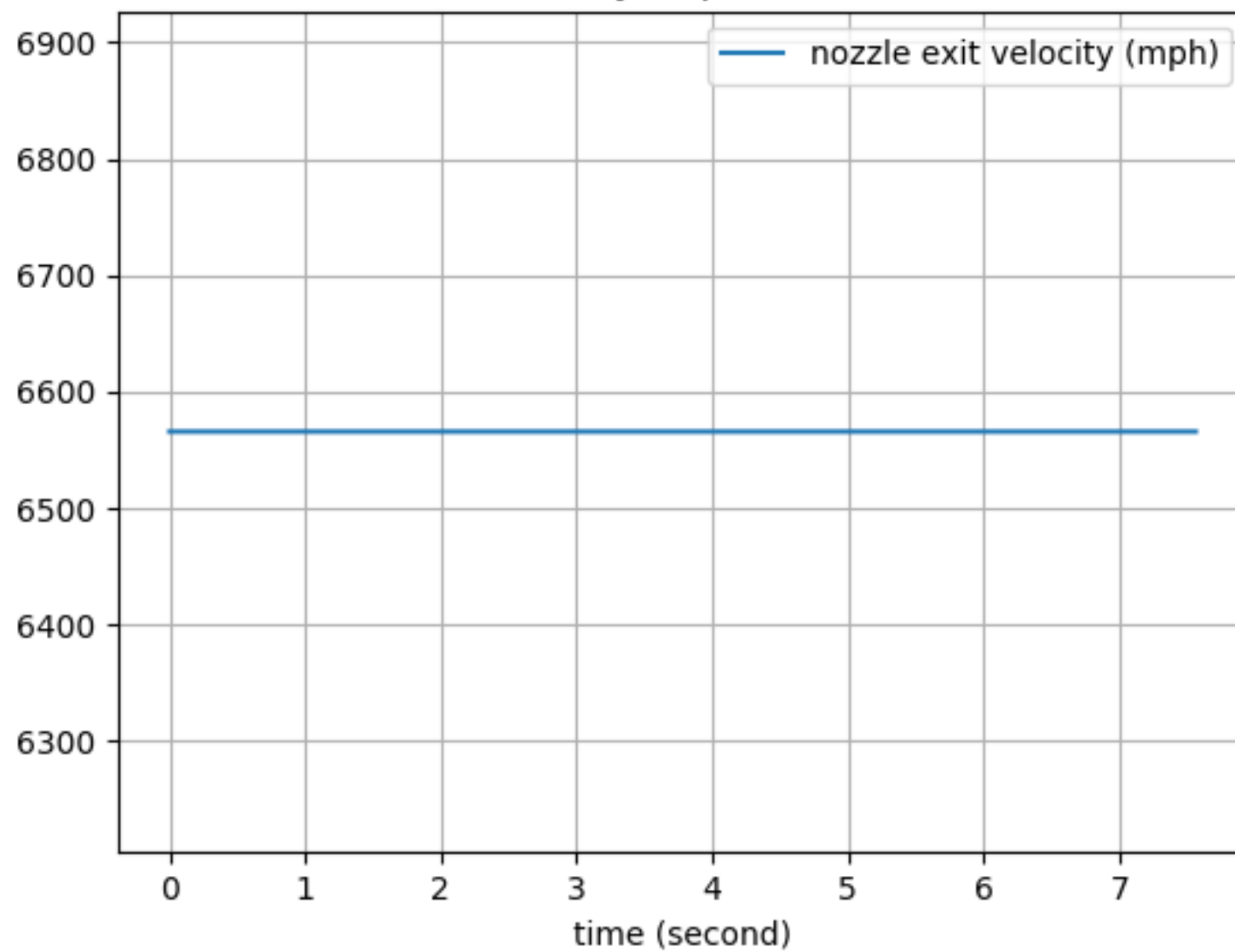


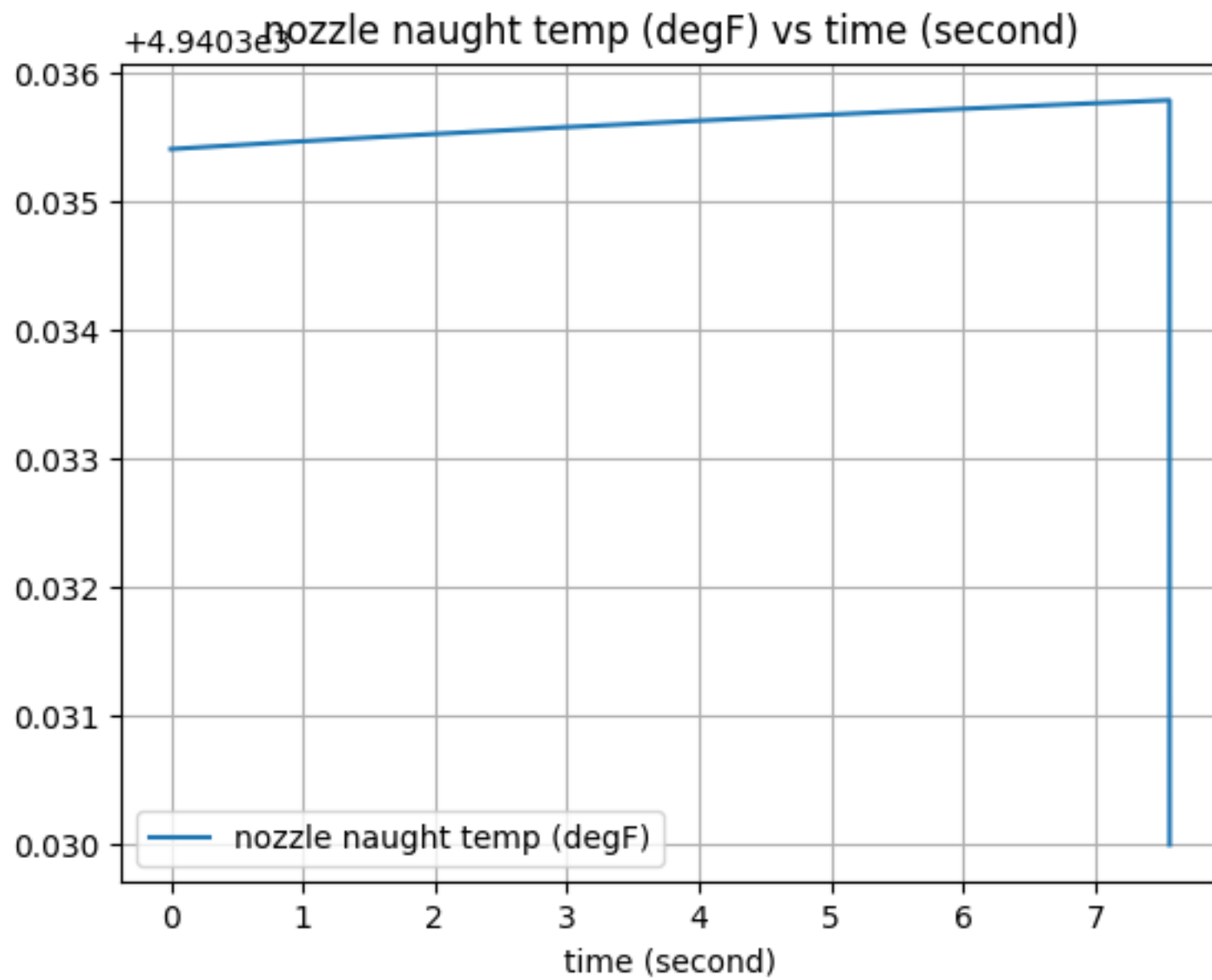


nozzle exit mach vs time (second)

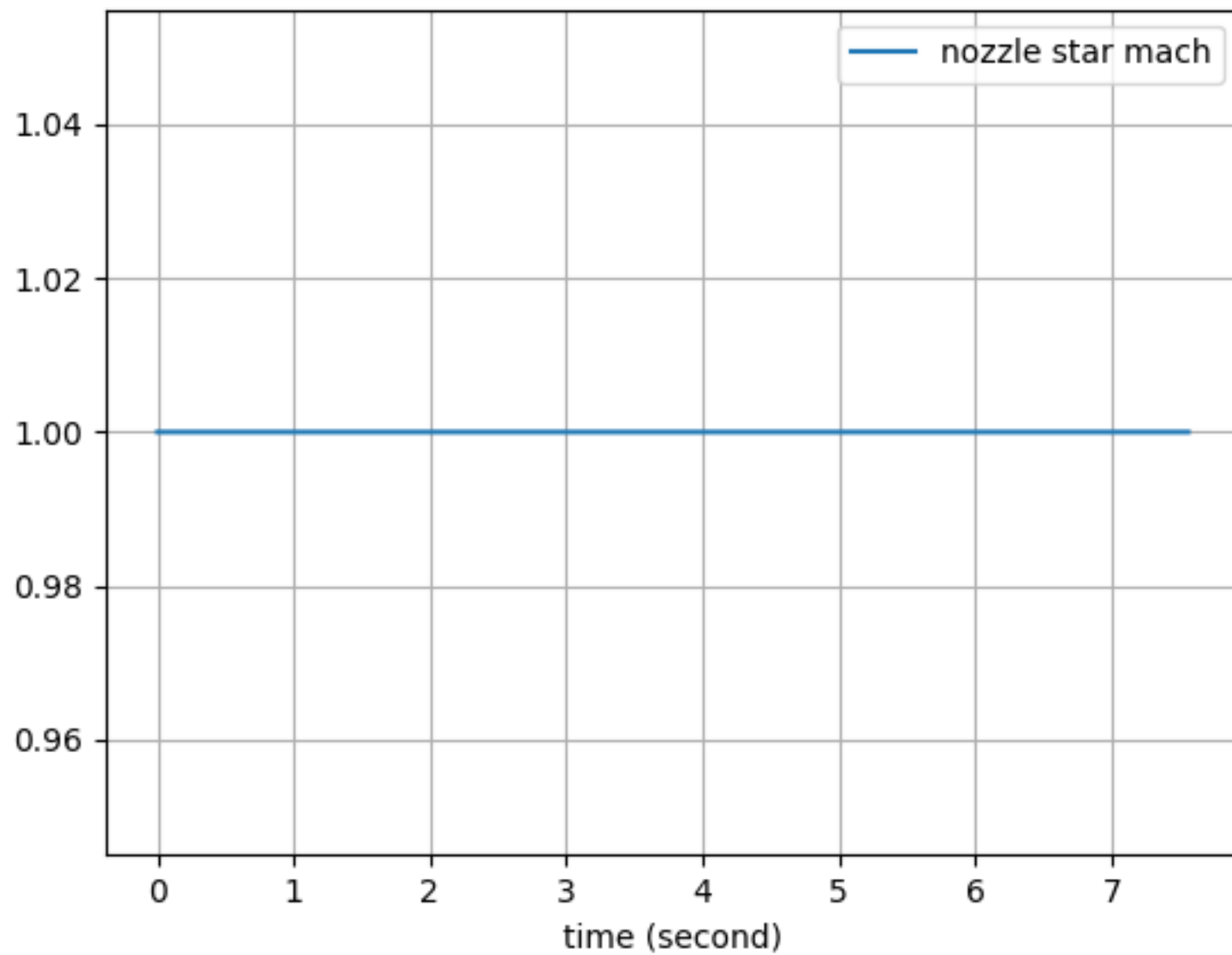


nozzle exit velocity (mph) vs time (second)

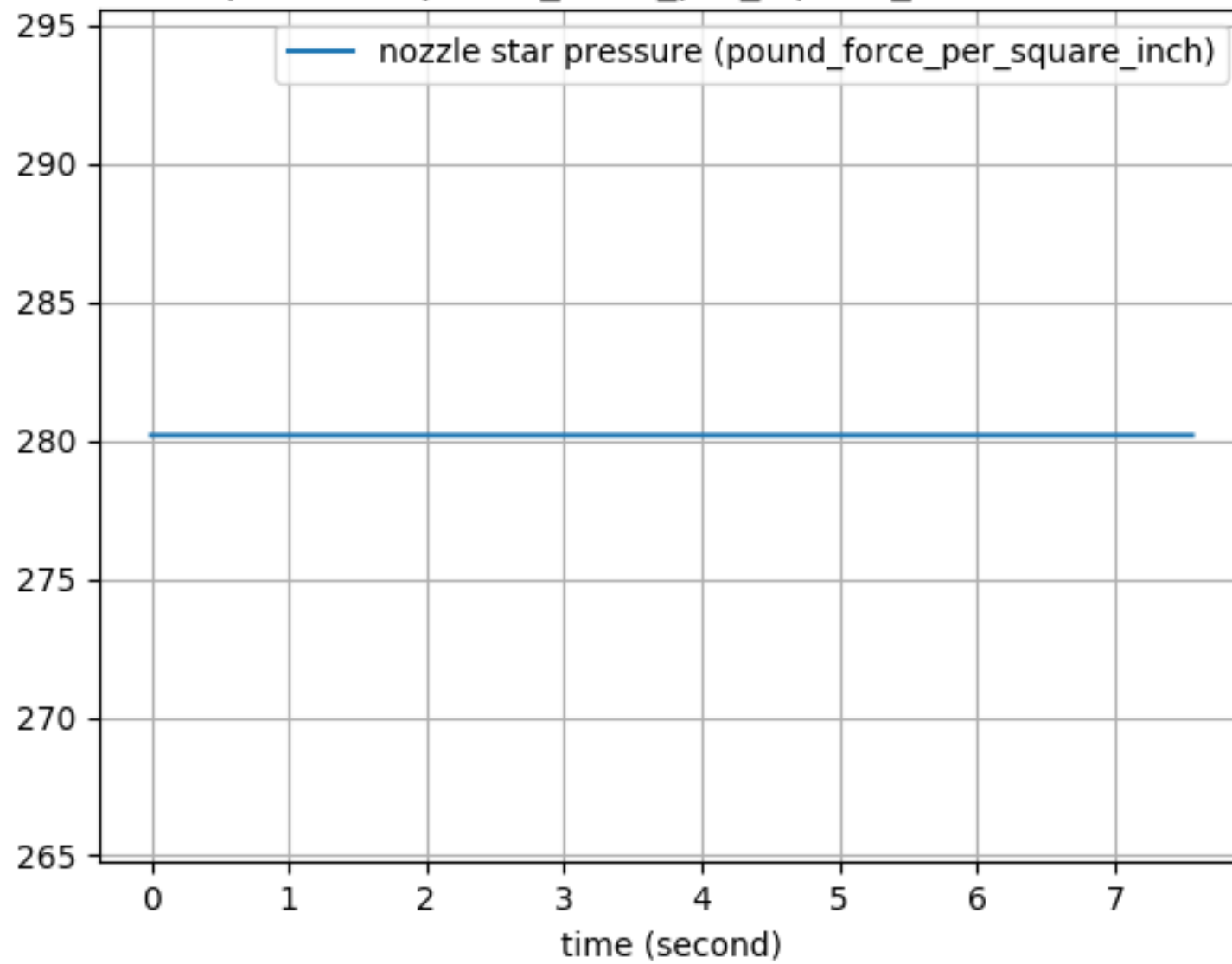




nozzle star mach vs time (second)

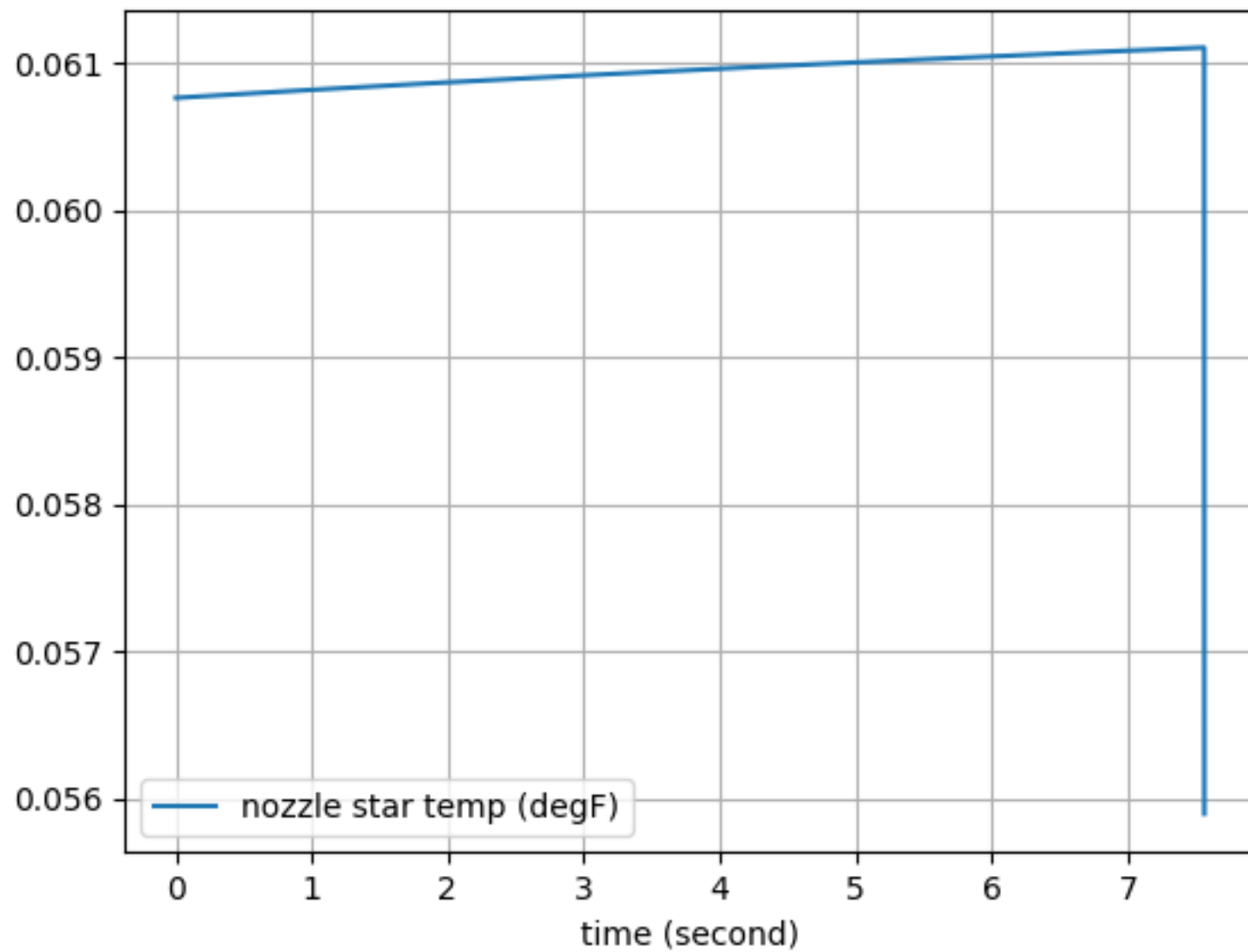


nozzle star pressure (pound\_force\_per\_square\_inch) vs time (second)

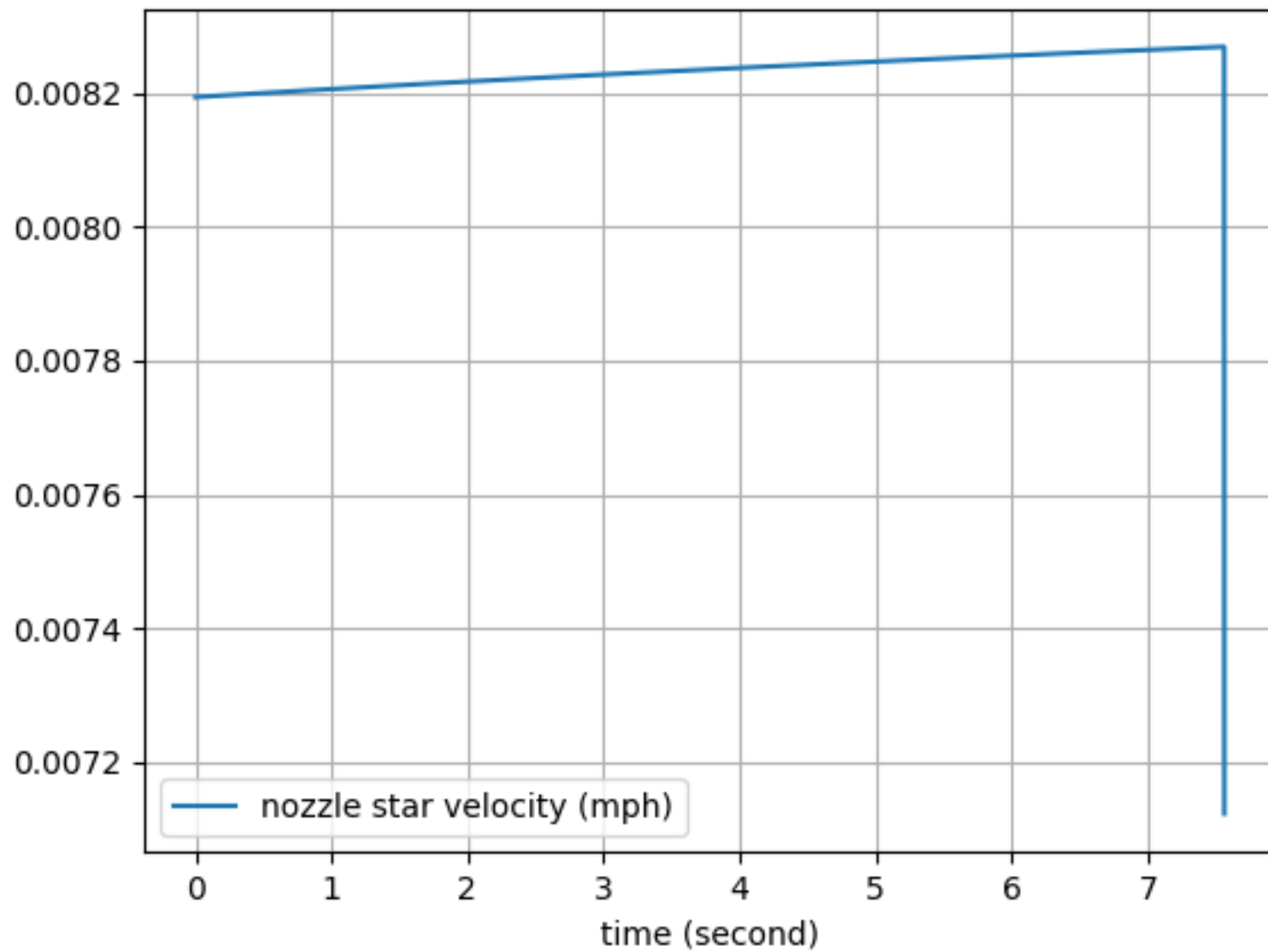




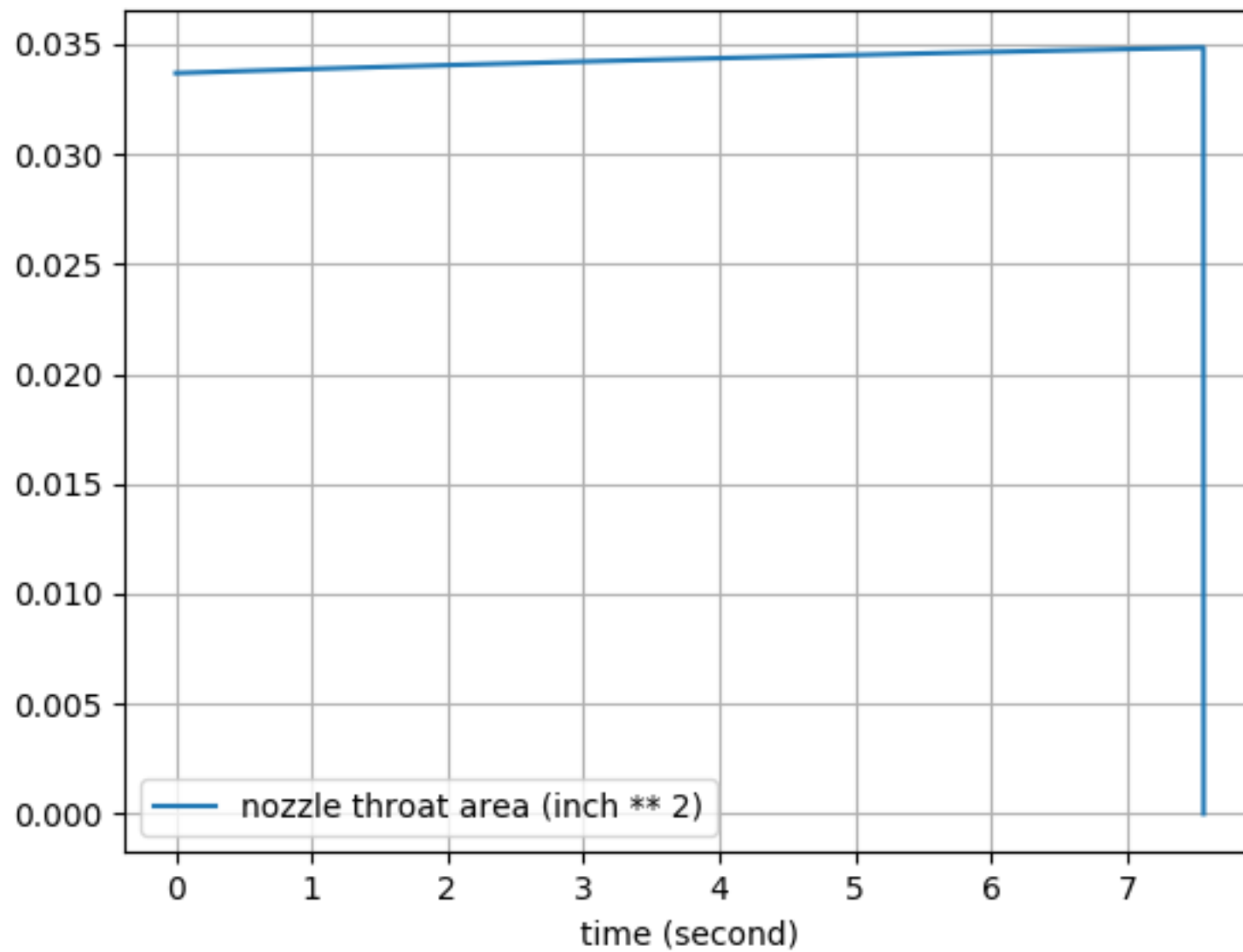
+4.403e3 nozzle star temp (degF) vs time (second)



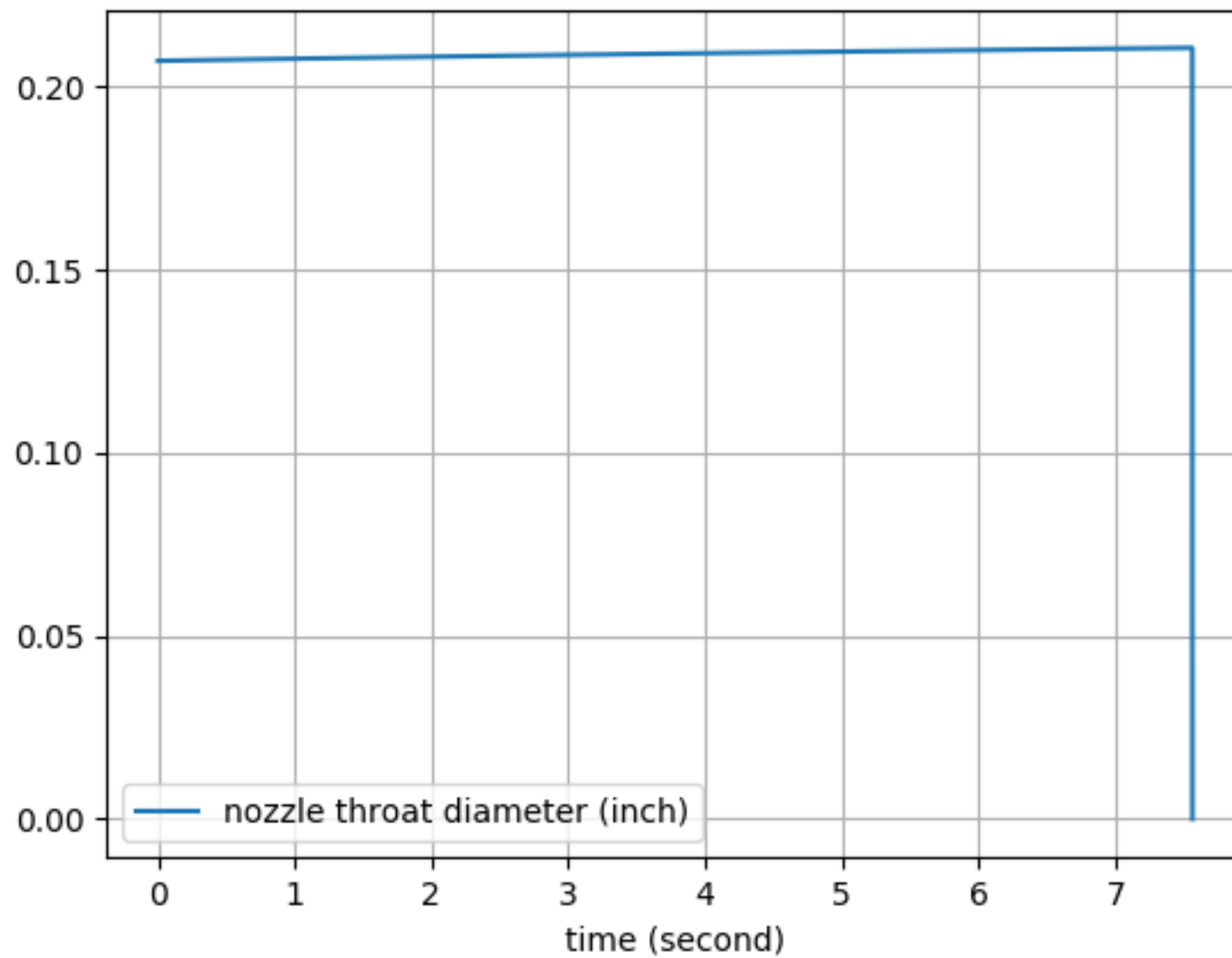
nozzle star velocity (mph) vs time (second)



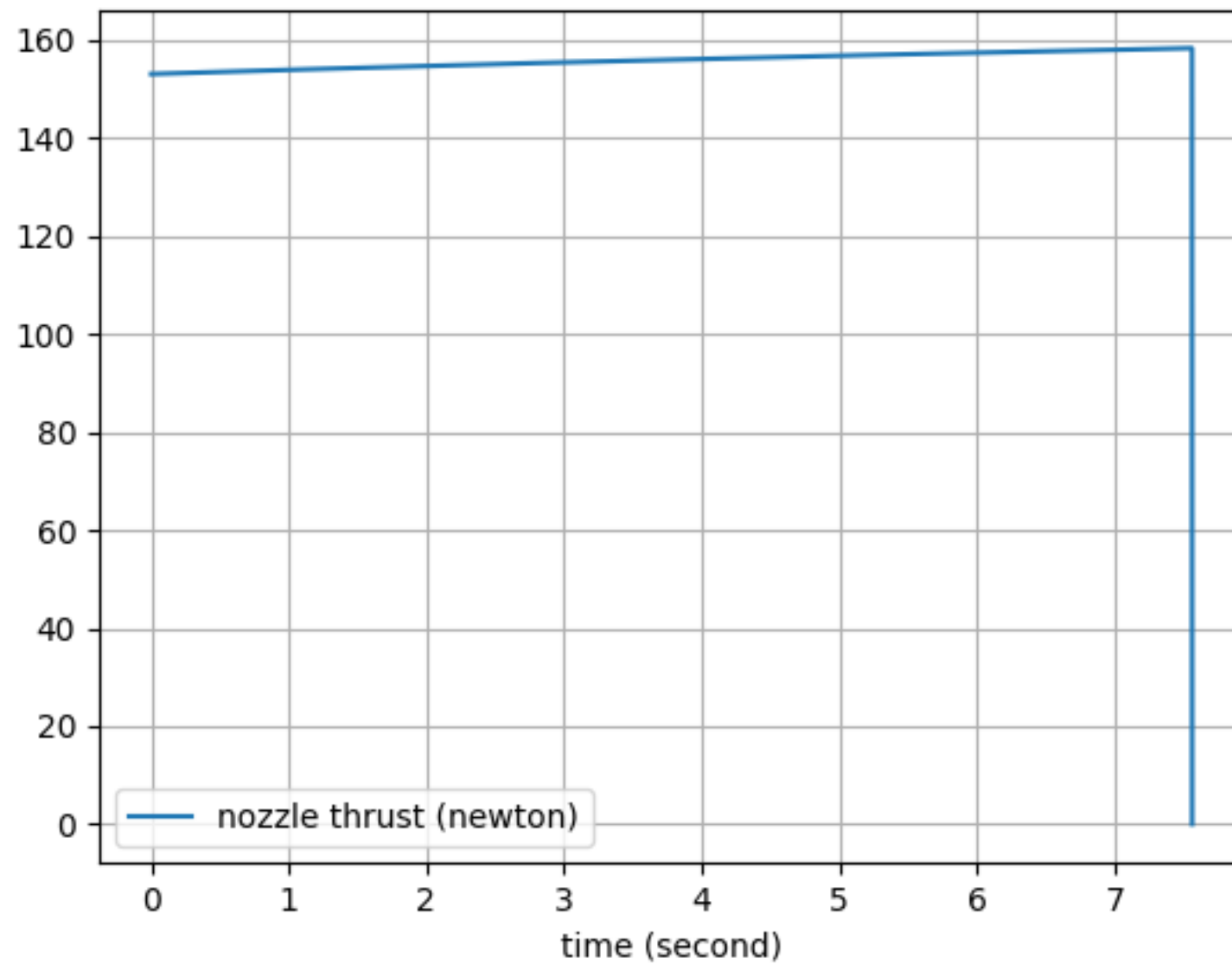
nozzle throat area (inch \*\* 2) vs time (second)



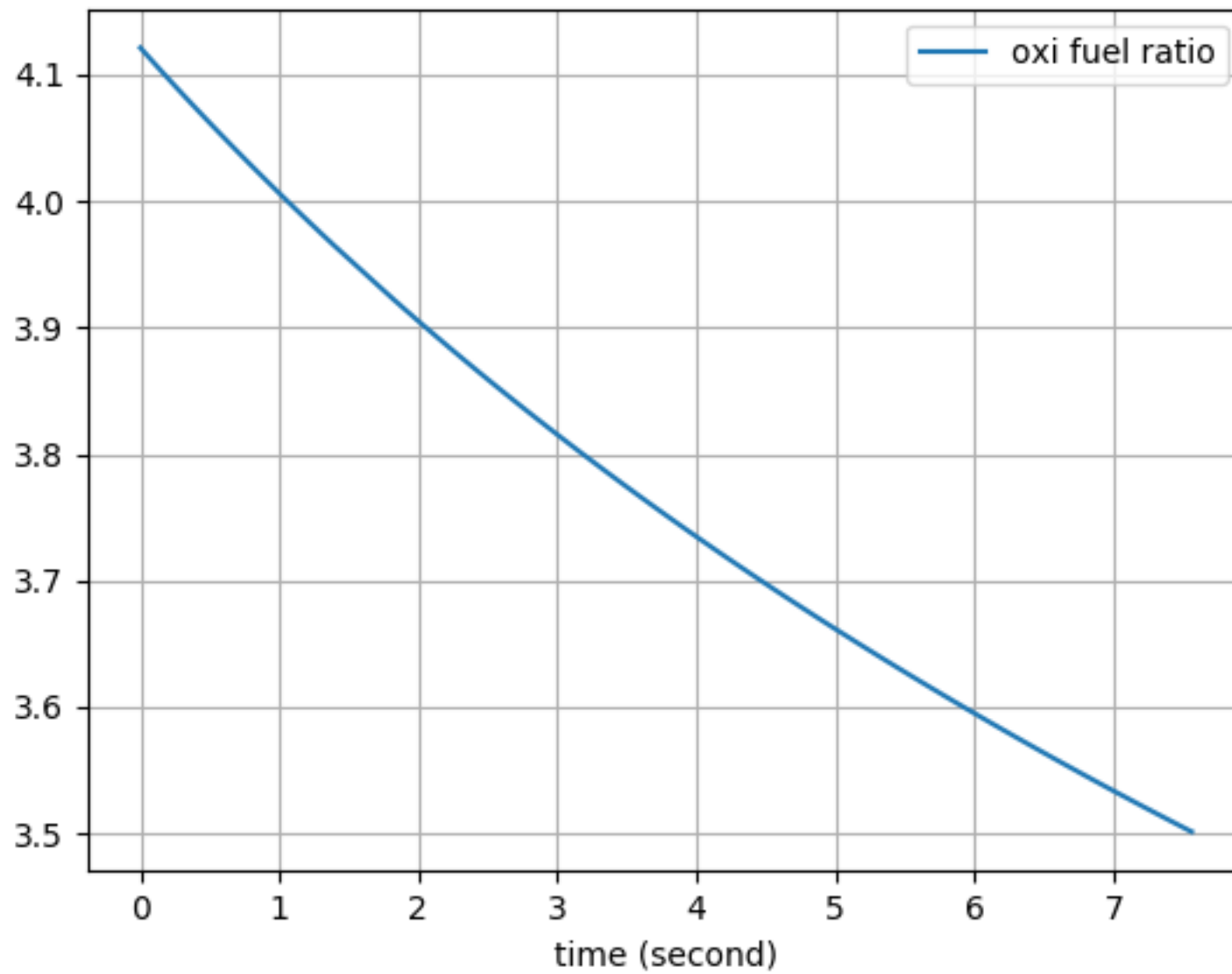
nozzle throat diameter (inch) vs time (second)



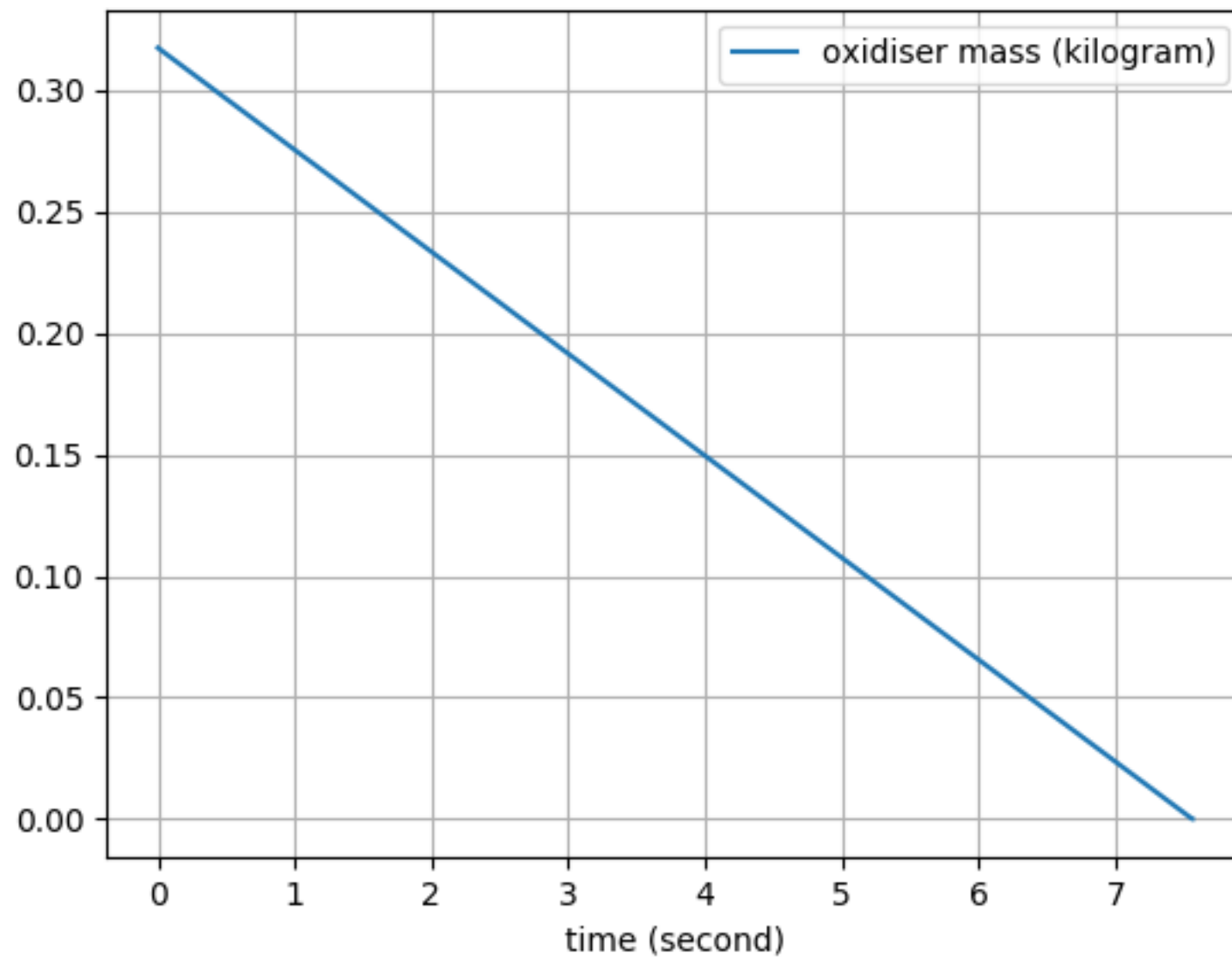
nozzle thrust (newton) vs time (second)



oxi fuel ratio vs time (second)



oxidiser mass (kilogram) vs time (second)



oxidiser mass flow rate (kilogram / second) vs time (second)

