**decision\_fitness (All measures in imperial🡪 in) [EXCEPTION: Apogee in km]**

is fit: True/False stating whether this rocket candidate meets design constraints

A\_t\_1: booster throat area

odia\_1: booster outer diameter

dia\_1: booster inner diameter

length\_1: booster propellent length

A\_t\_2: sustainer throat area

odia\_2: sustainer outer diameter

dia\_2: sustainer inner diameter

length\_2: sustainer propellent length

r1: booster fins root chord

sp1: booster fins span

t1: booster fins tip chord

sw1: booster fins sweep

r2: sustainer fins root chord

sp2: sustainer fins span

t2: sustainer fins tip chord

sw2: sustainer fins sweep

ig\_delay: second stage ignition delay. Optimizer also assumes a 2 second separation delay

chute1\_Br: diameter of booster recovery parachute

chute2\_S: diameter of sustainer recovery parachute

chute3\_NC: diameter of nose cone recovery parachute

diam: diameter of the rocket. WARNING: the final optimized rocket may display an incorrect (unscaled) diameter

n1: number of grains in the booster motor

n2: number of grains in the sustainer motor

apogee (km): apogee of the rocket multiplied by -1

everything else: all other values are constraints. For a rocket to be ‘fit’, all of these values need to be negative

**Event File (All measures in metric🡪 kg, m, kgm2)**

Event: string describing what is occurring in this flight event

wet: True/False, indicating whether or not propellant mass is included in this event’s calculations

m: mass of the flight event

cg: cg of the flight event

body length: body length of the flight event (excludes nose cone)

d\_nozzle : absolute distance from the cg of the flight event to the exit face of the nozzle

d\_prop : absolute distance from the cg of the flight event to cg of the current motor

d\_nose : absolute distance from the cg of the flight event to the bottom of nose cone

d\_finsets: distance from the cg of the flight event to the top of the fins. If there are multiple sets of fins, returns an array. Positive values indicate moving towards the nose cone from the cg.

l: total length of the flight event (includes nose cone)

I\_I: moment of inertia of the flight event in the i direction.

I\_Z: moment of inertia of the flight event in the Z direction.

**Components File (All measures in metric🡪 kg, m, kgm2)**

type: string describing what the component section primarily contains

m: mass of the components section

cg: relative cg of the components section measured from the top

l: length of the components section

I\_I: moment of inertia of the components section in the i direction

I\_Z: moment of inertia of the components section in the z direction

m\_dry: if the component section involves a motor, this is the mass without propellent

cg\_dry: if the component section involves a motor, this is the cg without propellent

m\_p: if the component section involves a motor, this is mass of just the propellent

m\_motor: if the component section involves a motor, this is mass of the entire motor (casing and propellent)

d\_fintip: if the component section involves fins, this is the distance from the top of the section to the top of the fins

I\_I\_dry: if the component section involves a motor, this is the moment of inertia in the I direction without propellent

I\_Z\_dry: if the component section involves a motor, this is the moment of inertia in the Z direction without propellent