Research project meeting summary: Trajectory Module for Launcher MDAO

Jorge L. Valderrama [1]
Dr. Annafederica Urbano [2] Dr. Mathieu Balesdent [3] Dr. Loïc Brevault [4]

[1]ISAE-SUPAERO, MSc. in Aerospace Engineering
[2]ISAE-SUPAERO, DCAS [3]ONERA, DTIS [4]ONERA, DTIS

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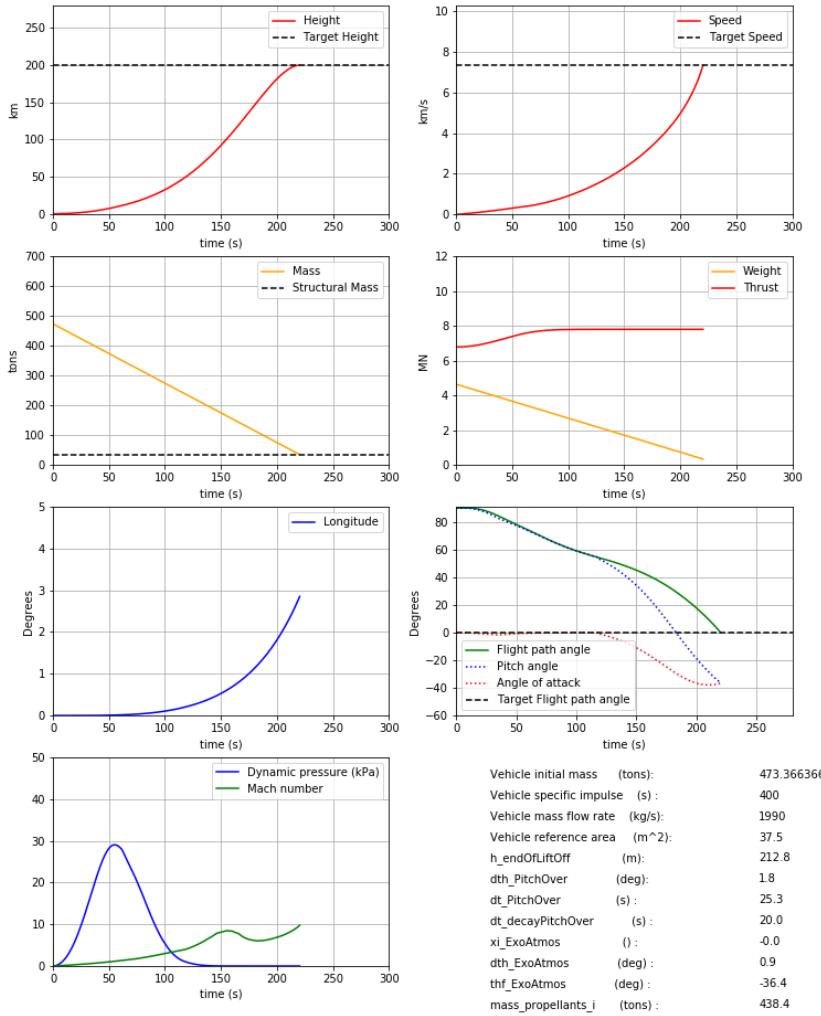
Plan:

1. Review of previous work
2. Key points discussed
3. Future actions

Review of previous work

Implementation of thrust model as a function of atmospheric pressure.
Successful convergence to feasible solution.



Vehicle initial mass	(tons):	473.3663668947246
Vehicle specific impulse	(s) :	400
Vehicle mass flow rate	(kg/s):	1990
Vehicle reference area	(m^2):	37.5
h_endOfLiftOff	(m):	212.8
dth_PitchOver	(deg):	1.8
dt_PitchOver	(s) :	25.3
dt_decayPitchOver	(s) :	20.0
xi_ExoAtmos	() :	-0.0
dth_ExoAtmos	(deg) :	0.9
thf_ExoAtmos	(deg) :	-36.4
mass_propellants_i	(tons) :	438.4
Iteration	:	275

Review of previous work

First steps in Dymos

- Started to code in Dymos based on the example available of the SSTO. I am using the 2D EoM for a rotating planet.
- Problems with installation of PyOptSparse. Thus, I am trying to run on ScipyOptimize as in the code shared by Dr. Brevault.

Key points discussed

- It is fine to run on use SciPy Optimize as optimization package.
- Events that define the termination of a phase can be triggered with option ”fix-final = True” instead of constraints.
- It is better to start using the 2D EoM for a non Rotating planet as the first steps in Dymos are difficult.
- The atmospheric model can be the simple exponential one for now and gravity constant to simplify the process at the beginning.
- Bounds for state variables are defined in the initial guess.
- Try to run and test the code after every implementation of a new phase to check everything is going right.

Future actions

- Continue to work in Dymos based on the code shared by Dr. Brevault and the examples available in Dymos. Keep in mind that model should be refined gradually starting from a simple one.