

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

¹ISAE-SUPAERO, MSc. in Aerospace Engineering

²ISAE-SUPAERO, DCAS

³ONERA, DTIS

⁴ONERA, DTIS



January 17, 2021

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

- Integration of FELIN structural module in my code
- To simplify, I'm only implementing the mass models for a "cryogenic/storable" propulsion system corresponding to LOx/RP1 for a Gas Generator cycle. All structures in Aluminum. Hydraulic Thrust vector control.

- As a first step, I integrated the code without analytic derivatives. It doesn't converge but it runs.
- As a second step, I'm modifying the code to use analytic derivatives. I already wrote them but still need to do the connections as this required converting some functions into classes.

- FELIN uses the maximum dynamic pressure for the structural module. How could we implement this with analytic derivatives?
A good solution would be to split the gravity turn phase into two. The end of the first sub-phase would be when the derivative of the dynamic pressure with respect to time is equal to zero. Then the node at which max dyn pressure happens would be known.
- Check FELIN's N2. For the second stage the models are simpler than for the first stage.
This is alright. Just add max load factor link to trajectory.
- Discuss code update to a newer version of Dymos.
This will be done by the new students.

- Continue working on the implementation of FELIN's structural module.
- Create an outline of the final report according to ISAE's requirements.