

4D Multiobjective Aircraft Trajectory Optimization with Varying Model Fidelity

In trajectory optimization, simplifications to the dynamics of the model are often made to reduce the computational load for e.g. real-time optimization and/or because there is only limited information available to approximate the model entirely. In this paper, the case of trajectory optimization for an Airbus A319 passenger aircraft is investigated with respect to the effect of different modeling approaches. Three model types are taken into account, a 3-Degrees of Freedom (DoF) model for the longitudinal motion (Base of Aircraft Data (BADA)), a 3-DoF inverse mass-point model and a 6-DoF rigid-body model. The rationale behind this study is to quantify the differences in optimization results caused by the modeling, inside a common optimization scenario. Results from this comparison are then used to fit a lower detailed model so that it closely matches the full 6-DoF model. This represents the first step of obtaining a fast-executing yet accurate reduced order model, for usage in a future real-time optimization setup.