

# Modelica Stage Separation Dynamics Modeling for End-to-End Launch Vehicle Trajectory Simulations

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Stage separation dynamics modeling is a critical capability of future launchers preparatory studies. The development of stage separation frameworks integrable in end-to-end launch vehicle trajectory simulations have been presented in the relevant literature but none profiting from the object-oriented and equation-based acausal modeling properties of MODELICA [1, 2]. The objective of this paper is therefore to present such an approach to this problematic. Based on the *Constraint Force Equation* (CFE) methodology [3, 4, 5], two case studies to evaluate the proposed approach are considered. Results demonstrate that the approach corresponds very well with the physics behind separation. In addition, we found easiness of implementation of the method within a single environment such as DYMOLA, demonstrating the benefits of an integrated approach.

## References

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