

## STRUCTURAL ANALYSIS OF LAUNCHER STRUCTURES BY MEANS OF REFINED BEAM MODELS

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**Key words:** *CUF, One-dimensional model, Component-wise, Launcher structure.*

The analysis of slender thin-walled structures, as a launcher, is a challenging problem. When these structures are discretized using solid FE models they require a large number of degrees of freedoms (DOFs) and therefore the analyses are very computationally expensive [1]. The present work use a refined 1D model based on the Carrera Unified Formulation (CUF)[2] to analyze slender structures. The present refined one-dimensional model has only displacements as unknowns therefore a complex structure can be easily analyzed connecting simpler one-dimensional structures, this approach is called Component-Wise (CW) (see [3]). The performances of the model in static and dynamic analyses are investigated. Simple and reinforced structure are considered. Finally a simplified launcher structural model, inspired to the Ariane 5, is analyzed. The results of the analyses show the quasi-3D capabilities of the present model and the CW approach has been proved to be a competitor of the solid FE models. In conclusion the refined one-dimensional model introduced in this work appears suitable for the analysis of slender reinforced thin-walled structures, it provides accurate results reducing the computational costs with respect the classical approaches.

### REFERENCES

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