ECOptimization of MicroLaunchers PhD RMIT- SUPAERO 2021

(3 years of scholarship starting from fall 2021, 18 months in France, 18 months in Australia)

Title	ECOptimization of MicroLaunchers
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Labs	RMIT/SUPAERO/Institut Clément Ader (ICA)

Subject :

Sustainable development has a growing interest at both institutes. The current space challenges will definitely incorporate eco-design [1] constraints in the loop of the MDO design [2]. This work will focus on the multidisciplinary design [3] including eco material selection [4] and using models from life-cycle analysis (LCA) studies for launch methods and systems [5]. Suitable metrics in order to assess the environmental impact in the context of production and operation of micro launchers will have to be established. The final step is the development an automatic design scenario depending on reusability /cost capable of creating new markets for micro launcher application for small satellites.

<u>Keywords</u>

Ecodesign Multidisciplinary Design Optimization CO2 impact Material selection Propellant selection Payload customization Market and cost in the design loop

References

[1] Ashby, M. F. (2012). Materials and the environment: eco-informed material choice. Elsevier.

[2] Gray, J. S., Hwang, J. T., Martins, J. R., Moore, K. T., & Naylor, B. A. (2019). OpenMDAO: An open-source framework for

multidisciplinary design, analysis, and optimization. Structural and Multidisciplinary Optimization, 59(4), 1075-1104.

[3] Affilipoae, T. P., Neculăescu, A. M., Onel, A. I., Pricop, M. V., Marin, A., Perşinaru, A. G., ... & Chelaru, T. V. (2018). Launch Vehicle-MDO in the development of a Microlauncher. Transportation Research Procedia, 29, 1-11.

[4] E. Duriez, J. Morlier, HALE multidisciplinary design optimization with a focus on eco-material selection, AEC 2020, Bordeaux [5] https://www.esa.int/Safety_Security/Clean_Space/ecodesign"