Study Project in the field of Hybrid-Electric Propulsion Technology in Aviation

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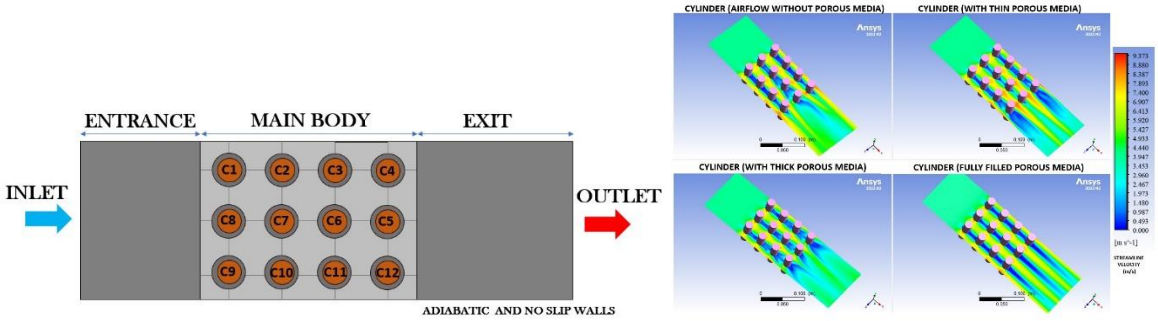
Battery cooling using cellular structures

Investigating the thermal behavior of different configurations of the porous media in battery packs and the subsequent effect on battery temperature, especially in the context of electrical and HEPS systems would be important for over all system level performance and the Thermal Management System performance. Numerical simulations of porous media, cellular structures integrated battery pack are carried out using ANSYS Fluent software by solving the governing fluid flow and heat transfer equations. This study provides insights into the design and optimization of battery cells, in several different configurations, for various applications.

Overview:

- Supervision and assistance in analyzing novel structures for battery cooling.
- CAD modeling, e.g. SolidWorks, NX, etc. of the different battery configurations
- Theoretical evaluation and selection from 1. Different battery configurations and 2. Different novel cellular structures that can be implemented for battery cooling.
- Heavy design analysis (possible design optimization) is required for critical evaluation and selection of design for 3D printing and experimental evaluation.
- Design optimization could be achieved via MATLAB or Python as suited.
- Possible implementation of AI techniques to simplify and speed up the overall optimization process.
- Post-processing of experimental results, including analysis of temperature and pressure results in inlet and outlet regions.
- Required supervision would be provided by respective PhD students.



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