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THE UNSTEADY AERODYAMICS OF SMALL WINGS AT MODERATE REYNOLDS NUMBERS

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ABSTRACT

Natural fliers and their robotic counterparts, operate over a range of chord-based Reynolds numbers between 1×10^4 and 1.5×10^5. In this regime, the aerodynamics of even rigid fixed wings are very sensitive to small changes in the geometry and the environment, making comparisons between experiments and computations very challenging [1]. In high-fidelity computations of such flows it is critical to reproduce the dynamics of the thin boundary layers and shear layers on the wing, to capture separation and other phenomena responsible for the production of lift and drag forces.

Oscillating wings, typically characterized by high pitching and/or heaving amplitudes, introduce additional complications. Grid quality, for example is a major issue for boundary conforming methods and, as a result, most computations today in this regime are done using non-boundary conforming (i.e. immersed boundary) methods.

The objective of this mini-symposium is to bring together computational and experimental scientists working in this field to share results and experiences and establish best practices and directions for future research.

REFERENCES

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