

Abstract Submitted
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Experimental and computational results of harmonically oscillating flexible and rigid flat plates SCOTT HIGHTOWER, PAULO FERREIRA DE SOUSA, JEREMY PENA, JAMES ALLEN, New Mexico State University — Oscillating flexible and rigid flat plates are studied with a combination of numerical simulations and experimental measurements. Visualization data and numerical simulations are used to classify the principal characteristics in the wake of the plates. Visualization data for each plate shows distinct differences between when and how efficiently thrust is produced. Visualization results show that thrust is produced at Strouhal numbers of 0.14 for the rigid plate and 0.20 for the flexible plate. Thrust is deemed to be present with the formation of a reverse Karman street. The flow was computed using a high-order compact finite-differences incompressible two-dimensional Navier-Stokes flow solver using an immersed boundary method. This represents a considerable improvement over existing second-order accurate immersed boundary methods. The experimental results are in good agreement with computations when the wake consists of an array of alternating vortices and either very weak or no leading-edge vortex formation.

James Allen
New Mexico State University

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