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Analysis of the Clapping Effect in Bio-inspired Flapping Wing Robots DIPAN DEB, MIQUEL BALTA MANICH, HAITHEM E. TAHA, University of California, Irvine — The goal of this research is to investigate different designs of the bio-inspired flapping wing robot in terms of thrust and the power consumption. Initially two kinds of mechanical birds were investigated, one with two wings and another with four. It has been observed that for same power consumption the four wings bird is generating more thrust. This phenomenon has been observed for a wide range of flapping frequencies (4-22Hz. To check whether clapping has any effect, two new birds with four wings were designed: one that clapped partially, and another that was made with a separator in between the wings; which prevents the wings from clapping. When these new models were tested, it has been observed that they generate lesser Thrust than the full clap bird. Therefore, the phenomenon of clapping is changing the nature of the flow in such a way that the bird is getting some extra thrust. To understand the flow physics, a smoke flow-visualization setup has been made to investigate the flow field around the flapping wing qualitatively. The flow visualization was done different sections of the wing to capture the 3D nature of the flow field. Presently, load cell data have been acquired to measure the thrust and lift time history over the flapping cycle.

Dipan Deb
University of California, Irvine

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