

Abstract Submitted  
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**Effects of mass ratio to flexible flapping-wing propulsion**<sup>1</sup> MIN XU, MINGJUN WEI, TAO YANG, THOMAS BURTON, New Mexico State University — In our previous work, we used a strong-coupling approach to simulate highly flexible wings interacting with surrounding fluid flows. However, there was a strong assumption: the wing structure has the same density as the surrounding fluid. Though this assumption has greatly simplified the formulation and worked well in most of our previous studies, it made impossible to consider the effects of mass ratio between the structure and fluid. In this study, we introduced another body force term to represent the density difference and also modified the formulation so that almost no extra cost was added in order to consider the mass ratio effects. Using the new algorithm, we found an interesting nonlinear response of the trailing-edge frequency to the active plunging frequency at the leading edge when certain flapping frequency and mass ratio were chosen.

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