Abstract Submitted
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A numerical study of flapping wings in tandem configuration at low Reynolds number[1] GONZALO ARRANZ, OSCAR FLORES, MANUEL GARCIA-VILLALBA, Universidad Carlos III de Madrid — Direct numerical simulations of wings in in-line tandem configuration are presented. % The wings undergo a two-dimensional optimal kinematics. % This optimal motion is a combination of heaving and pitching of the airfoils in a uniform free-stream at a Reynolds number 1000 and Strouhal number 0.7. % The objective of the study is to analyze how three-dimensional effects influence the aerodynamic performance of the wings. % To that end, wings of two different aspect ratios, 2 and 4, undergoing the two-dimensional kinematics are considered. % Simulations show that the interaction between the vortical structures of the wings is similar to the 2D case. % However, it is found that 3D effects are detrimental in terms of hind-wing's thrust generation. % On the contrary, the propulsive efficiency remains constant both in 2D and 3D, for both aspect ratios. % Simulations of flapping motion are also presented and compared to the previous wings in heaving motion. % It is found that aerodynamic forces and propulsive efficiency decrease when the wings are in flapping motion due to a sub-optimal motion of the inboard region of the flapping wings.

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