عنوان مقاله:

Parametric Optimization of a Cyclogiro Aircraft Design for Efficient Hover with Aeroelastic Considerations

محل انتشار:

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نویسندگان:

Louis Gagnon - *Institute of Aerodynamics and Gas Dynamics, Universität Stuttgart, ۷۰۵۶۹, Germany*

Marco Morandini - *Department of Aerospace Science and Technology, Politecnico di Milano, ۲۰۱۵۶, Italy*

Stéphane Fournier - *Department of Aerospace Engineering, University of Bristol, BS۸ ۱TR, United Kingdom*

خلاصه مقاله:

A minimization procedure is proposed to orient the design of a vertical take-off and landing drone towards sustainability. The vehicle is a novel cycloidal rotor drone and the principal objective is to yield the best ratio of payload to power consumption. The drone blades, rotor arms, and frame are designed for fused deposition modeling additive manufacturing with polylactic acid. ۱۰ variables for the geometry, operation parameters, and material infill percentages are explored in search of the optimum design. A special derivation procedure allows obtaining the symbolic equations for the weight and power consumption of the drone. This permits optimization with a hybrid genetic and gradient method and exploring a broad range of aircraft sizes. ۷ constraint equations ensure that the necessary assumptions made for the derivation remain valid and that the structural strength is adequate. For each new configuration, this method allows to quickly find a new optimum design using a desktop computer. Also, modifying the constraints, variables, or objective function is straightforward. Finally, the resulting design has a power loading of ۰.۰۸۷۶ N/W.

کلمات کلیدی:
drones, cycloidal rotors, payload, ۳D printing, power loading

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