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Wind tunnel testing of hybrid buoyant aerial vehicle (Article)

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Abstract

Purpose - Realistic data bank of aerodynamic and stability derivatives is still missing for **hybrid buoyant aerial** vehicles. Such vehicles take-off and land similar to an aircraft with their partial weight purpose of this paper is to use **wind tunnel testing** for a better understanding of the aerodynamic and static stability behavior of such vehicles. Design/methodology/approach - The effect of wing on t characteristics of a clean configuration **hybrid buoyant** is analyzed. The free stream velocity is 20 m/s, and ranges of angle of attack and side slip angle are from -8° to 12° and -16°, respectively. Da effect of strut interference and zero load condition. The maximum blockage of the model with respect to the cross-section area of the test section is about 2.7 per cent. Findings - A **hybrid** model man is an optimum solution with less number of parts. The **vehicle** is statically, longitudinally and directionally stable. Wings designed to fulfill the partial requirement of lift contribute significantly to cour the voluminous hull for centre of gravity location ahead of the leading edge of the wing. Research limitations/implications - There are number of manufacturing constraints for scaling down a model c configuration. Specially, the thickness of the wing limits the **testing** envelop of angle of attack and free stream velocity. Practical implications - The data presented here are a preliminary guide for furth data may also be used to build and perform flight tests on small full-scale instrumented models and to obtain flight dynamics data. Originality/value - The estimated aerodynamic and stability deriva future for multidisciplinary design. © Emerald Publishing Limited.

Author keywords

Aerodynamics and stability; **Hybrid buoyant**; **Wind tunnel testing**

Indexed keywords

Engineering controlled terms: Aerodynamic configurations; Aerodynamic stability; Angle of attack; Angle of attack indicators; Automobile manufacture; Buoyancy; Fighter aircraft; Flight dyn research; Lift; Stability; Vehicles; **Wind** stress; **Wind** tunnels

Cross-section area; Design/methodology/approach; Free-stream velocity; **Hybrid buoyant**; Manufacturing constraint; Multi-disciplinary designs; Stability derivatives; **Wind-tunnel testing**

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