CONCEPTUAL SIZING AND MULTICRITERIA OPTIMIZATION OF UAV FOR SNOW STUDIES

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Abstract

This paper describes a methodology for conceptual design and sizing of a UAV to be used for snow cover evaluation and other scientific studies in lower Himalayas. The problem is posed in a multi-criteria optimization framework with wing span (representing size) and stall speed (representing performance) as the two conflicting objective functions. Eleven design variables are considered, which relate to the geometry and mass. In addition, an engine selection parameter is also used. Inequality and equality constraints are imposed on the design. The design is optimized with genetic algorithm independently for takeoff mass and stall speed. Multi-objective optimization is carried out for the stall speed and wing span as objective functions. For most cases, the optimum configuration has the lowest wing aspect ratio, highest wing t/c ratio, smallest aircraft length and highest flap area fraction. Low aspect ratio and high t/c for the wing result in lower wing weight.

Keywords : *UAV, Optimization, Genetic algorithm*

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