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Estimating the internal volume requirement in a multivariate conceptual design synthesis of a blended wing body aircraft

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The desire to create environmentally friendly aircraft that is aerodynamically efficient and capable of conveying large number of passenger over long ranges at reduced direct operating cost led aircraft designers to develop the Blended Wing Body (BWB) aircraft concept. The BWB aircraft concept represents a paradigm shift in the design of aircraft. The design offers immense aerodynamics and environmental benefits and it's suitable for the integration of advanced systems and concepts like laminar flow technology, jet flaps and distributed propulsion. However, despite these benefits, the BWB is still a long way from being developed for commercial air transport. This is due to structural, stability and handling quality challenges as well as passenger's apathy to riding in an aircraft without windows. The goal of this research is to develop a design tool that enables the exploration of the design space of a BWB as well as provide a framework to determine the most appropriate solution to several of the challenges affecting the realisation of the BWB airplane. The tool utilises multivariate optimisation methodology to facilitate the investigation of advanced concepts within a range of applications as against point design. This paper discusses the packaging module which determines the most suitable internal volume arrangement to enable the BWB meet its designed mission and satisfy environmental concerns. The module combines geometry parameterisation and interpolation techniques to determine sufficient volume for major components of a BWB as well as ensure all objects remain within the geometry during multivariate optimisation.

Biography

Paul Okonkwo is currently in the second year of his Ph.D. at Cranfield University School of Engineering. He obtained M.Sc., Aerospace Engineering (Aircraft Design) from the Delft University of Technology, the Netherlands in 2009.

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