Development and Application of a Parametric Design Tool for Design Iterations of Large Turboprop Aircraft

Abstract:

In the context of an increasing congestion of air traffic flows worldwide, a high-capacity turboprop transport aircraft was designed at the Institute of Aircraft Design of Technical University of Munich that is specifically aimed at serving short- and mid-range routes. Within the scope of research on the concept, this paper presents a parametric aircraft design tool that was created at the institute to support comprehensive analyses and design iterations of large turboprop aircraft. Through a modular approach, the tool covers a broad range of design-related disciplines including aerodynamics, mass prediction, and propulsion and performance modeling. The tool was employed to examine the institute’s turboprop concept. It revealed critical design features and drivers of the concept. During multiple design loops, parameter variations were carried out, and the aircraft was redesigned until the top-level aircraft requirements and certification constraints were met. Finally, mission performance and fuel efficiency of the revised concept were evaluated with the tool.
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