

## **Simulation framework for civil tiltrotor mission performance**

### **ABSTRACT**

A simulation framework for the overall mission performance of a civil tiltrotor system is presented. In this work, a numerical model of a benchmark tiltrotor aircraft's flight dynamics is paired with a high-fidelity simulation of the turboshaft powerplant. The gas turbine simulation of the baseline engine is shown to have high accuracy with its available performance data from flight and stationary tests. The simulation is further validated by the obtained maximum range and endurance performance based on the XV-15 tiltrotor. The power requirements during the different phases of tiltrotor flight are also modelled including the transition phases between rotary- to fixed-wing. A mission framework is designed to show the estimated fuel burn and emissions. The mission procedures are based on the flight envelope data available in the public domain as well as modern helicopter operations. This work can be used as the baseline for the modelling of conceptual configurations of civil tiltrotors, particularly for variations in powerplant technologies.

**Keyword:** Gas turbine engines; Mission performance; Rotorcraft simulation; Programming and simulation; Tiltrotors