ABSTRACT

The rapidly developing technological world has created growing aviation demands regarding aircraft performance, operation and crucially; environmental impact. The urge to achieve aviation sustainability has led the industry to focus on implementing alternative configurations, such as Distributed Propulsion systems coupled with sustainable power sources. In this Thesis, a Distributed Electric Propulsion configuration powered by a liquid Hydrogen Fuel-Cell system is implemented on a small, commercial Light Sport Aircraft, specifically the Zodiac CH 650 B produced by Zenith Aircraft Company. The purpose is to perform a structural analysis on the Zenith Zodiac CH 650 B modified wing using both analytical and finite element methods and also compare it to the original configuration. The analytical method relies on strength of materials and aerodynamic theory while the finite element method also requires designing and modeling the wing structure in CATIA and ANSYS respectively. Aircraft performance improvements are also evaluated, as Short Take Off Landing capabilities, noise reduction, efficiency increase and (near) zero emissions are required characteristics of future aviation.

Keywords

Commercial Aircraft, Wing Structural Analysis, Distributed Electric Propulsion, Sustainable Aviation, Liquid Hydrogen Fuel-Cell