

https://dspace.org/

Unequal load-sharing in a multi-stage axial-flux permanent magnet synchronous machine.

Braid, James Ian.

2012-01-25
http://hdl.handle.net/10539/11174

Downloaded from a DSpace repository. https://dspace.org/

Abstract

Axial-flux machines, by the nature of their topology, are suited for high torque, low speed applications. In an attempt to improve the power-to-mass ratio of such a machine, the feasibility of stacking several alternate stator and rotor sections onto a common shaft in a multi-stage configuration was investigated. A prototype 5 kW double-stage machine was developed for comparison to other designs presented in the literature. Although the results appeared promising, whilst under evaluation, an unequal load-sharing anomaly was observed: even though both stages contributed to driving the load, one stage always dominated. Furthermore, the discrepancy appeared to be dependent on the direction of rotation. This research investigates and explains the cause of the unequal load-sharing and presents design considerations to aid the future development of multi-stage machines.