

DYNAMIC ANALYSIS, SIMULATION & DESIGN OF WINCH FOR ENERGY EXTRACTION BY AIRBORNE PARAFOLS

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Winch designs for tethered Airborne Wind Energy systems with cyclical power generation phases require detailed analysis to fully investigate and suitably design winching systems within the overall control system.

Efficient and effective control of tether tension must be maintained and distributed between the winch controller and the kite control pod while simultaneously enabling efficient power take off. The airborne system is highly coupled to the dynamics of the ground winch system and as such detailed analysis of the interaction between these systems is required. Dynamic analysis of this nature has been carried out by the authors.

This analysis has led to the development of a winch design which is tailored specifically to the requirements of an AWE system. Through the use of clutching mechanisms the reel out and reel in functions can be mechanically and electrically separated, reversing only the components required to retrieve the tether/airborne system.

This results in a reduced dynamic response time of the machine and enables the possibility of extending the generation phase into recovery phase.



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