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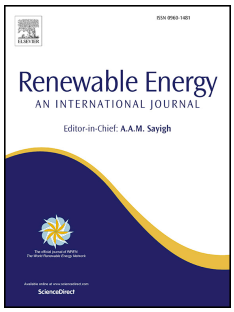


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PII: S0960-1481(17)30587-6

DOI: 10.1016/j.renene.2017.06.083

Reference: RENE 8950

To appear in: *Renewable Energy*

Received Date: 25 October 2016

Revised Date: 19 June 2017

Accepted Date: 22 June 2017

Please cite this article as: Cho W, Lee K, Choy I, Back J, Development and experimental verification of counter-rotating dual rotor/dual generator wind turbine: Generating, yawing and furling, *Renewable Energy* (2017), doi: 10.1016/j.renene.2017.06.083.

# Development and Experimental Verification of Counter-Rotating Dual Rotor / Dual Generator wind turbine : Generating, Yawing and Furling

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**Abstract**

This paper deals with the control techniques for counter-rotating dual rotor / dual generator(CRDRDG) wind turbine and its experimental verifications of the performance in the field. The authors have already proposed the dynamic model and some control techniques in the previous researches, which exploit some features of the CRDRDG structures, and verified the controllers by numerical simulations and lab-scale experiments. In this paper, we present experimental results obtained using a full scale ($15[kW]$) CRDRDG in the field. To perform the field experiments, an integrated control algorithm is proposed. The experimental results show that the integrated control algorithm effectively maximizes the output power of the CRDRDG wind turbine while operating in the region below rated power, and limits the output power while operating in the region above rated power. Furthermore, the experimental data reveals an additional advantage of the counter-rotating dual rotor system. The data shows that the system can lower the tip speed ratio at which Cp curve attains its maximum, almost by half in comparison to the conventional three bladed single rotor system, possibly reducing the noise caused by rotor blades.

*Keywords:* Wind turbine, Yawing, Furling, Dual generator, Maximum power point tracking,, Counter-rotating dual rotor

## 1. Introduction

During the last few years, the renewable energy has been widely developed since the environmental issues has emerged as a major problem around the world. Compared to other renewable energy resources, the wind energy conversion system is favorable in that it can provide a large amount of power despite its relatively expensive establishment cost. A commercial report shows that

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