



***NUMERICAL AND EXPERIMENTAL
INVESTIGATIONS OF A DIFFUSER AUGMENTED
WIND TURBINE PERFORMANCE***

By

Eng.: Mohamed Badr Saad Farghaly

A Thesis Submitted To The
Faculty of Engineering at Cairo University
In Partial Fulfillment Of The
Requirement for the Degree Of
DOCTOR OF PHILOSOPHY

**In
AEROSPACE ENGINEERING**

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
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Key Words:

Flanged diffuser, Diffuser augmented wind turbine, Wind turbine blades, Wind tunnel experiment, and tunnel test of a diffuser augmented wind turbine.

Summary:

The main purpose of the present thesis is investigate numerically and experimentally how to improve the performance characteristics of a DAWT system that may be used as an independent power supply to the remote and rural areas in Arab Republic of Egypt. The various diffuser geometric shape parameters that significantly affect the diffuser efficiency are studied numerically aiming to reaching the best diffuser configurations which satisfy the maximum approaching wind speed near the diffuser entrance. The subsequent improvement of the turbine performance characteristics due to applying the best diffuser configurations are calculated and compared with the conventional wind turbine. In additional, experimental tests are performed to validate the numerical models adopted in the current study.

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DAUGHTER AND MY BROTHERS**

**For their Patience and Encouragement
That made this work possible**

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