Experimental Analysis of Airfoils of wind turbine for drag and pressure distribution

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ABSTRACT:

In order to handle the current energy and environmental concerns facing the world, renewable energy sources, such as wind power, are essential. Improving the effectiveness and performance of wind turbine blades is crucial in the field of wind energy. By conducting an experimental examination of airfoil wind turbine blades with an emphasis on drag and pressure distribution, this thesis intends to develop the technology of wind turbines. To establish a thorough understanding of the present state-of-the-art in wind turbine blade design and the various airfoil shapes used in the industry, the research starts with a thorough literature review. To obtain optimum performance and minimize drag, which ultimately results in higher energy conversion efficiency, it is essential to choose the right airfoil profiles. The results of this study will help us better understand how airfoil wind turbine blades operate aerodynamically, especially in terms of reduced drag and optimised pressure distribution. The findings will be helpful for academics, designers, and manufacturers of wind turbines who want to maximise the effectiveness and sustainability of wind energy conversion systems. This thesis concludes with an experimental investigation of airfoil wind turbine blades with a focus on pressure distribution and drag. The study intends to provide important insights into the aerodynamic performance of airfoil profiles, which will help in the development of more effective and environmentally friendly wind turbine designs. The results could lead to improvements in wind energy technology, which would ultimately lead to a greener and more sustainable future.

Keywords: wind energy, wind turbine blades, airfoil profiles, drag reduction, operating conditions, pressure distribution, flow behavior, efficiency, sustainability, renewable energy