Computational aerodynamics optimization of wind turbine's blade twist angle

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Wind turbine blades are a major component in the wind turbine system as it captures the wind's energy. The design of the blade is thus essential to ensure optimum energy harvesting. In this study, simulations using the finite element method were carried out to investigate the effect of the blade's dimensions and configurations to obtain the optimum twist angle and shear webs separation distance as a function of blade's chord length. During the aerodynamic analysis conducted on wind turbine system modeled with optimum real dimensions in terms of cost of energy generated (COE) suggested from previous literature, it was found that there is a linear relationship between the twist angles and shear webs separation distance. As the twist angle of the blade increases, the separation distance between the shear webs must be increased inside the blade to decreases the effect of the aerodynamic pressure affecting the top surface of the blade to avoid potential damage of the its structure. It was found that the optimum twist angle for the blade design is 22.5° with separation distance of 0.35% chord length.

Biography
Moudar Zgoul is an Associate Professor of Mechanical Engineering at the American University of Madaba-Jordan. He has completed his PhD from the University of Surrey – UK in Applied Mechanics. He has published more than 25 papers in reputed journals. He is the chairman of the Mechanical Engineering Department at the American University of Madaba.

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