
PERFORMANCE ANALYSIS OF WIND TURBINES WITH DIFFERENT CHARACTERISTICS

Dragoljub Tanovic^{1*}, Jelena Svorcan², Ognjen Pekovic¹

¹University of Belgrade- Faculty of Mechanical Engineering, Department of Aerospace Engineering, 11000
Belgrade, Serbia

*Corresponding author e-mail: dtanovic@mas.bg.ac.rs

Abstract

Growing concerns about global warming, environmental pollution and the rise in the price of fossil fuels have led to an interest in developing renewable and environmentally friendly energy sources, such as wind, solar, geothermal, hydrogen and biomass as a replacement for fossil fuels. Therefore, the research of renewable energy, and wind energy in particular, is in constant expansion. Wind energy can provide appropriate solutions to the global climate and energy crisis. The use of wind energy basically eliminates the emission of harmful gases such as CO₂, SO₂ as in traditional coal-fired power stations or radioactive material waste in nuclear power plants.

There has been a tremendous increase in wind energy worldwide over the last three decades. In 2009, the global yearly installed wind power reached 37 GW, bringing the total wind capacity to 158 GW. As the most promising renewable, clean and most reliable source of clean energy, it is expected to occupy a much larger part in electricity distribution all over the world. Wind turbines are types of power plants that use renewable energy, wind, to generate electricity.

The purpose of this paper is to analyze wind turbine with vertical axis - VAWT, that have two or three blades. Two methods were used for preliminary aerodynamic studies and they are BEM - Blade Element Momentum and DMS - Double Multiple Streamtube, usually adopted for early turbine design and rating. The program used in this work is QBlade. Obtained results enable the comparison of computed power curves of different geometries.

Keywords

Renewable energy, Wind energy, Wind turbines, QBlade

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