

Aerodynamic Analysis of the Airfoil of a VAWT by Using 2D CFD Modelling

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Abstract : Colombia is a country where the benefits of wind power industry are barely used because of the geography in some areas does not allow the implementation of onshore horizontal axis wind turbines. Furthermore, exist rural areas without access to the electrical grid. Therefore, there is currently a deficit of energy supply in some towns. This research took place in one of those areas (i.e. Chicamocha Canyon-Santander) where the answer to the energy supply problems could be the use of vertical axis wind turbines, which can be used for turbulent flows. Hence, one task of this research is the analysis of the wind resources in the Chicamocha Canyon in order to implement the wind energy. The wind turbines must be designed in such a way that the blades take good advantage of the wind resources in the area of interest. Consequently, in the current research the analysis of two different airfoils (i.e. NACA0018 and DU 06-W-200) through a 2D CFD simulation is carried out by means of a free-software (OpenFOAM). Predicted results using the “Spalart-Allmaras” turbulence model are similar to the wind tunnel data published in the literature. Moreover, global parameters such as dimensionless lift and drag coefficients were calculated. Finally, this research encourages VAWT studies under wind turbulent flows in order to achieve the best use of natural resources in Colombia.

Keywords : airfoil, wind turbine, turbulence modelling, Chicamocha, CFD

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