HORIZONTAL- AND VERTICAL-AXIS WIND TURBINES MOUNTED ON INCLINED-ROOF HOUSES

[1]K. ASFAR, [2]M. NAZZAL,[3]M. ARAFAT, [4]A.MUSLEH, [5]A. ZA'REER

Jordan University of Science and Technology, Irbid 22110, Jordan
E-mail: Kasfar52@gmail.com

Abstract - The idea here is to utilize the high velocity wind that develops when wind blows over the inclined roof of individual homes (Venturi effect). Single and dual-rotor wind turbinesare mounted on a vertical axis on the highest point in a house with inclined roof. The rotors in this design consist of three or fourblades, there is a spacing between the two rotors in the case of the dual rotor turbine. A vertical axis wind turbine is also mounted on the same shaft such that their combined torque is used to generate electricity from a generator on the same axis below the dual-rotors and located inside the house. This design has been chosen after numerically experimenting with several designs of horizontal rotor blades.The blades have been designed using Creo Elements/Pro Engineer program. The proposed wind turbine has been tested numerically using the CFD program;XFLOW. The horizontal tangential forces on the blades were calculated by a function viewer. First, the horizontal forces were evaluated. Second, the resultant forces and torque exerted by the blades on the vertical shaft are calculated. Finally, the effect of introducing thisconceptto augment the power generated by the upper vertical wind turbinewas investigated experimentally. A model house has been built with a vertical axis wind turbine (a Savonius rotor). The proposed augmentation horizontal axis rotors were mounted on the same vertical shaft. Testing of the complete system was carried out successfully. Thus, the theory behind this idea was verified experimentally as well.