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# Consideration about H-type rotor with the Magnus effect

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*Abstract*: One significant disadvantage of vertical axis wind turbines (VAWT) is a fluctuation of the pitch angle during rotor rotation. A H-type rotor, which is a lift-type rotor, consists of straight airfoil blades producing a shaft torque by means of a lift force. The lift force depends on the pitch angle. While the rotor is rotating, the pitch nonlinearly changes twice at one spin of the rotor from zero to the highest value. Between these levels, the pitch angle reaches a certain value. Which means the available maximum value of the lift force is not achievable for current aerodynamic conditions. The pitch angle is between relative velocity of the blade and linear velocity. In this work the authors consider a H-type rotor which uses the Magnus effect to generate lift force: straight blades are replaced by Magnus rotors. The lift force produced by the rotation of cylinders is independent on the pitch angle. Thus, the cylinders may create similar lift force in all angular position of the rotor. The pitch angle with high value is ideal because of bigger tangential component of the force (torque). Classic airfoils generate lift force until stall phenomenon occurs (i.e. 14 degrees). Rotating cylinders can operate with 45 degrees pitch and more. It has to be noted that value of the lift force may be higher than airfoil. However, large drag force could also appear. The goal is to find a specific aerodynamic condition and proper geometry of the rotor to increase turbine efficiency. The authors propose mathematical formulation of the problem and some preliminary results in this work.

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