

## ***Interactive comment on “Skewing angle magnet and coil reduced starting torque in a permanent magnet synchronous generator for a small vertical axis wind turbine” by Priwan Pongwan et al.***

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 Comments 1) To split the results and the discussion into two different sections in the paper. I think the discussion will be more clear if all results are presented first and then they are discussed in a separate section. 2) The authors have to explain the experimental procedure more clearly in terms of what the rotation speed is during the presented test results. This is especially the case for figure 3 and figure 4. 3) For vertical axis wind turbines there is often a linked relation between the turbine shaft power and both the incoming wind speed as well as the turbine rotation speed. Thus

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there is often a wind speed vs. rotation speed curve giving the optimal tip speed ratio for a specific turbine rotor.

3.1 This relation is not clear from figure 7 and 8. Thus it seems that the rotations speed reported in figure 8 are quite high for the turbine rotor. It was not possible to find figure 7 in the reference stated as Suppachai et. al. 2019 and it was therefore hard to check. Please clarify if Suppachai et. al. 2019 is correct.

3.2 It will be appropriate to provide a description of what the turbine is going to do when it is started at a wind speed of  $v = 2$  m/s.

3.3 Do you plan to spin up the rotation speed without the electrical load connected and then increase the electrical load at rated rotation speed?

3.4 Or do you plan to connect a constant electrical load and spin up the turbine with the load connected?

3.5 It will be good if this is discussed in relation to the start-up torque measurements presented in figure 3 and 4.

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 Edited by Montri Luengchavanon and the team

- This article have already edited that split the results and discussion - All the rotational speed of 650 rpm, the maximum power generated around 300 W, but it is depend on the skewing magnet and coils technique. - This article explained more the relationship between Figure 4 (b) [Orinal Figure 3(b)] and Figure 5 [Original Figure 4] by “Fig 5 shows comparison values between the starting torque that collected peaks value from Figure 4 (b) and power when changing the skewing angle magnet-coils in the PMSG generator.”

3.1 Due to the results from Suppachai et. al. 2019 used a spring torque and the wind tunnel is limited. So, this article was installed standard torque meter with high speed wind tunnel (0-10 m/s) and Savonius and H-Darrieus wind turbine, this article

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was added Figure.3. For explained the relationship between figure 8 and 9 (original Figure 7 and 8) that Figure 8 shows the related between rotation speed, torque and wind speed. Figure 9 is related to Figure 8 by rotation speed which used skewing angle magnet-coil at 15-0 degree, it can be really reduced starting torque and cut-in at 2.1 m/s.

3.2 The cut-in of this vertical wind turbine cannot start turning at 2.0 m/s wind speed due to the systems combined force of Tstarting, friction and weight of accessory. Hence, the real operation of this vertical axis wind turbine system used (Savonius and H-Darrieus) and skewing magnet-coil at 15-0 degree that can be cut-in at 2.1 m/s as shown in Figure 8 [Original Figure 7].

(3.3 and 3.4) Yes, this experiment was firstly spin up the rotation speed without load and then increased the electrical load at many rated rotation speed.

3.5 Figure 4(a) [original Figure 3 (a)] represents the starting torque are without electrical load. Figure 4(b) [original Figure 3 (b)] represented the starting torque are connected the electrical load. Figure 5 [Original Figure 4] is related Figure 4(b) [original Figure 3 (b)] which Figure 5 was compared the maximum peaks of starting-up torque at all the skewing magnet – coils that looking for high power and low start-up torque.

Please also note the supplement to this comment:

<https://wes.copernicus.org/preprints/wes-2020-101/wes-2020-101-AC2-supplement.pdf>

Interactive comment on Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2020-101>, 2020.

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Fig. 1.

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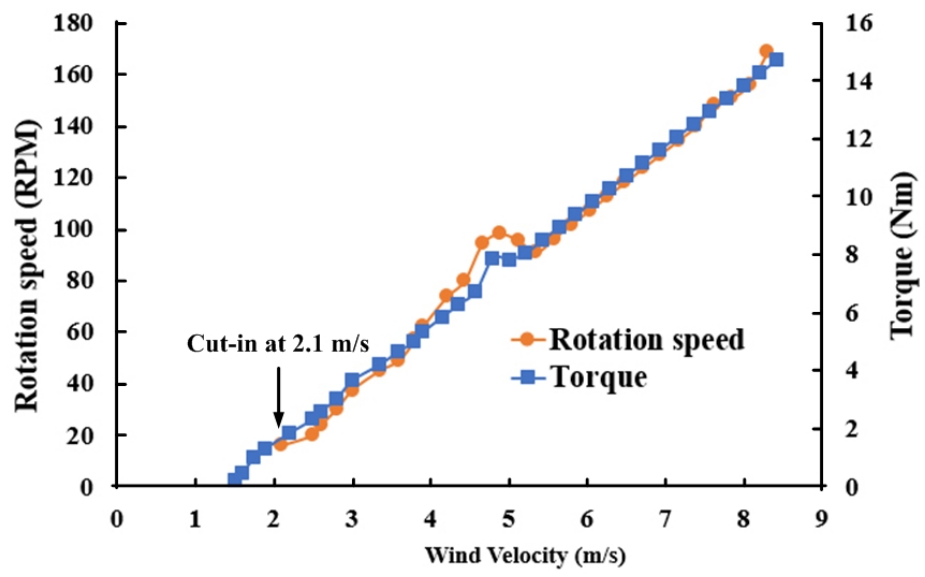


Fig. 2.

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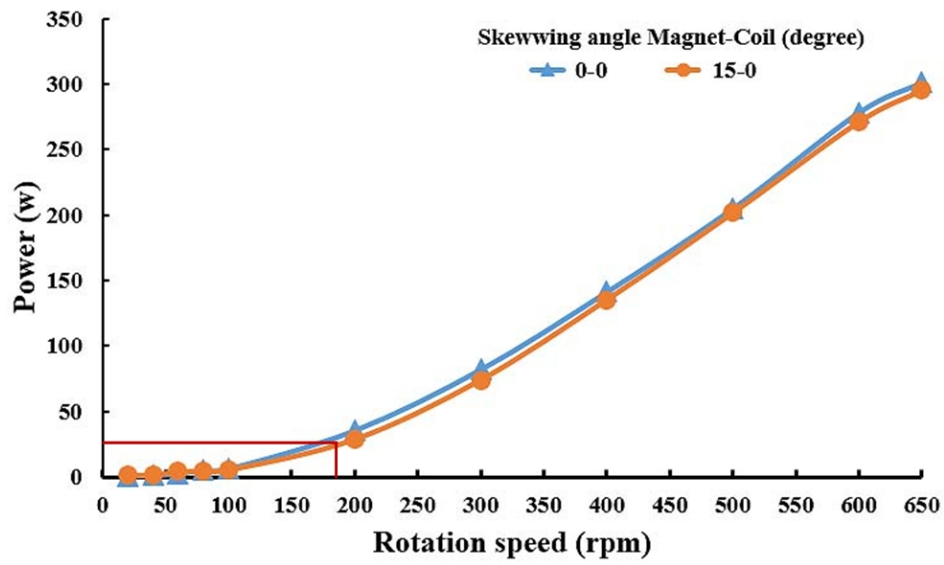


Fig. 3.

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