

Sessions: Renewable energy

Preferred presentation Type: Oral

New Advances on Small Wind and Hydrokinetic Turbines

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Abstract:

The advances in wind and hydrokinetic turbines have been strongly increased in the last decades, mainly on aerodynamic efficiency. One of the most relevant advances is on shrouded turbines, which are able to exceed Betz-Joukowsky limit (Silva et al., 2018) if the power coefficient is based on the rotor diameter. This work intends to show some aerodynamic advances on small wind and hydrokinetic turbines, especially regarding to the optimization of wind and hydrokinetic turbines with and without diffuser effect (Fig. 1a and b). An extension of Vaz & Wood's optimization (Vaz & Wood, 2016, and Vaz & Wood, 2018) in order to consider the influence of the diffuser speed-up ratio regarding cavitation effect is shown.

Key-words: Wind turbine, Hydrokinetic Turbine, Diffuser Technology.

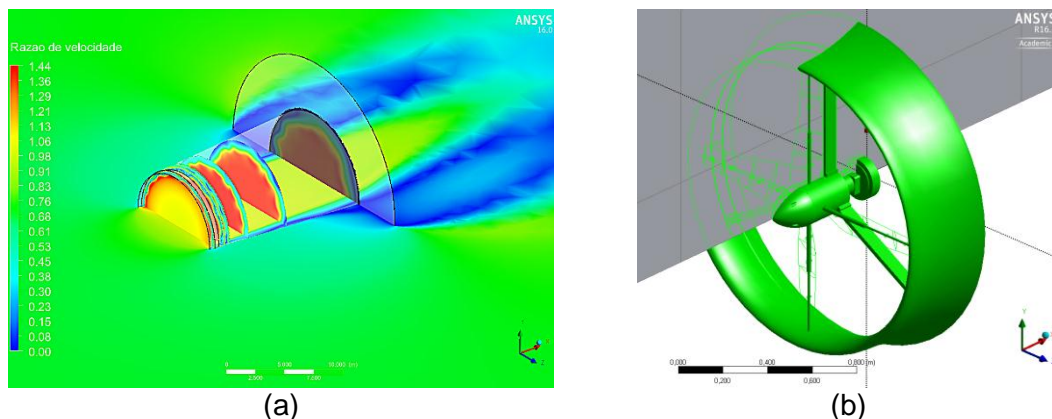


Figure 1: (a) Illustration of the static pressure condition on a blade section. (b) Power coefficient as a function of the tip-speed ratio.

References:

Silva, P. A. S. F., Rio Vaz, D. A. T. D., Britto, V., Oliveira, T. F., Vaz, J. R. P., Brasil Junior, A. C. P. (2018). A new approach for the design of diffuser-augmented hydro turbines using the blade element momentum. *Energy Conversion and Management*, 165, 801-814.

Silva, P. A. S. F., Shinomiya, L. D., Oliveira, T. F., Vaz, J. R. P., Mesquita, A. L. A., Brasil Junior, A. C. P. (2017). Analysis of cavitation for the optimized design of hydrokinetic turbines using BEM. *Applied Energy*, 185, 1281-1291.

Vaz, J. R. P., Wood, D. H. (2018). Effect of the diffuser efficiency on wind turbine performance. *Renewable Energy*, 126, 969-977.

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Colocar a palestra do prof. Jerson para

Dec. 11, 2018 (Tuesday), entre 10:00hs to 10:50h (Seminar 9)

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