

Sessions: Renewable energy

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PERFORMANCE ASSESSMENT OF A SMALL WIND TURBINE

Carlos H. P. dos Santos¹, Ana M. da Silva², and Jerson R.P. Vaz¹

¹Graduate Program in Mechanical Engineering – PPGEM, Institute of technology, Federal University of Pará, 66075-110, Belém, PA, Brazil.

²Faculty of Economic Sciences; Institute of Applied Social Science, University of Pará, 2626, 66.050-540, Belém, PA, Brazil.

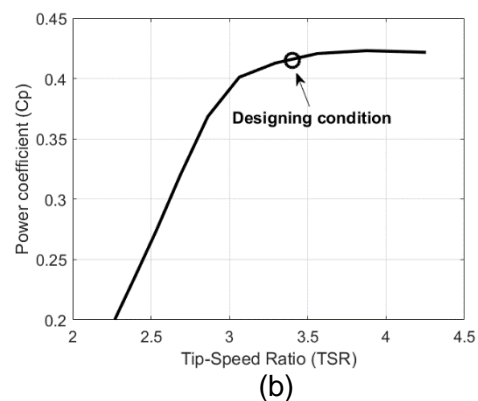
Abstract:

The search for alternative systems of electric power generation in isolated regions has become increasingly intense throughout Brazil. Electrical generation using wind energy arouses great interest due to the good wind potential in the country's coastal regions (BLASQUES et al., 2010). However, the large presence of wind turbines in the market with characteristics not conditioned to low wind speeds, which exist in much of the Amazon region, has made it difficult to develop economically viable technologies for small applications. In this work a project of a small turbine was developed (Fig. 1a), which will be tested in the Laboratory of Mechanical Engineering (LABEM) located at the Federal University of Pará - UFPA, Campus Belém, and finally installed in a small community in the State of Pará. In this work a survey of the power coefficient (Fig. 1b) in the region was carried out, and from models developed within this institution, such as: Vaz et al. (2011a), Vaz et al. (2011b), Rio Vaz et al. (2012), Rueda et al. (2012) has developed an innovative product that seeks to improve the performance of the wind system in a low wind speed condition, contributing to the development of new wind turbine design models with diffuser for the social inclusion of isolated communities of the Amazon Region.

Key-words: Wind turbine, renewable energy, small generation systems.



(a)



(b)

Figure 1: (a) Picture of the small wind turbine. (b) Power coefficient as a function of the tip-speed ratio.

References:

Vaz, J. R. P., Pinho, J. T. and Mesquita, A. L. A. An extension of BEM method applied to horizontal-axis Wind turbine design. *Renewable Energy*, vol 36, pp-1734-1740, 2011a.

Vaz, J. R. P., Pinho, J. T. and Rio Vaz, D. A. T. D., On a Generalized Formulation for the Optimization of Chord and Twist Angle of Wind Blade, ISES Solar World Congress, 28 august – 2 september 2011, Kassel – Germany, 2011b.

Vaz, J. R. P., Mesquita, A. L. A. e Pinho, J. T. Um Novo Modelo Matemático para a Otimização da Corda e do Ângulo de Torção de Pás Eólicas, III Congresso Brasileiro de Energia Solar, Belém, Pará, Brasil, 2010.

Vaz, J. R. P., Rio Vaz, D. A. T. D., Mesquita, A. L. A. e Pinho, J. T. Um Novo Modelo Matemático para a Otimização Aerodinâmica de Turbinas Eólicas de Eixo Horizontal, submetido e aceito no VII Congresso Nacional de Engenharia Mecânica, São Luis, Maranhão, Brasil, 2012.

Rio Vaz, D. A. T. D., Blanco, J. C., Vaz, J. R. P., Mesquita, A. L. A. e Pinho, J. T. Uma Abordagem Matemática para o Projeto de Turbinas Hidrocinéticas de Eixo Axial, submetido e aceito no VII Congresso Nacional de Engenharia Mecânica, São Luis, Maranhão, Brasil, 2012.

Rueda, S. A. J., Vaz, J. R. P. e Mesquita, A. L. A. Modelagem do Acoplamento Rotor- Gerador Elétrico em Turbinas Eólicas de Eixo Horizontal, submetido e aceito no VII Congresso Nacional de Engenharia Mecânica, São Luis, Maranhão, Brasil, 2012.

Blasques, L. C. M., Pinheiro, D. DA C., Pinho, J. T., Silva, A. e Lowe, J., Caracterização da Potencialidade Eólica e Análise Comparativa entre Diferentes Aerogeradores Para Localidades Costeiras das Regiões Norte e Nordeste do Brasil, III Congresso Brasileiro de Energia Solar - Belém, 21 a 24 de setembro de 2010.