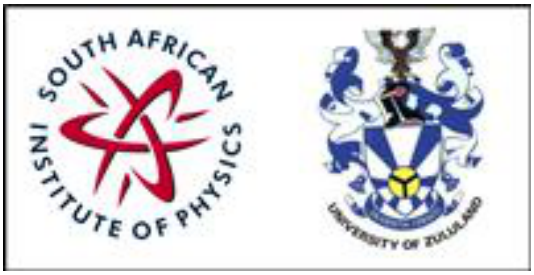

Contribution ID: **440** Type: **Oral Presentation**

Effect of air dynamics in the concentrator and behind the rotor on power output of a Concentrator Augmented Wind Turbine (CAWT)

Friday, 12 July 2013 10:50 (20 minutes)

Abstract content
   (Max 300 words)

The installation of commercially available conventional wind turbines is limited by the fact that they are generally designed for wind speeds greater than 3ms⁻¹. This limits the choice of physical locations where wind farms can be implemented. The installation of a concentrator can significantly improve the efficiency of the wind energy extraction system. This paper focuses on the improvement of performance efficiency for turbines in areas which experience wind speeds that are less than 3ms⁻¹. It also seeks to gain more insight into the air dynamics in the concentrator and behind the rotor and its impact on generator power output.
To maximize wind energy extraction there is need to understand various flow features that may be present in the system which include: turbulence, eddys, veer and wake effects and their influence on power output.
Computational fluid dynamics was used simulate pressure and velocity distributions from the point of air entrance to the concentrator to behind the rotor and their impact on turbine power output. A DAQ system was used to monitor the CAWT system in LabVIEW. Smoke and ribbons were used to demonstrate air dynamics in the CAWT and behind the rotor. Preliminary results show that the speed-up and pressure across the blade plane is not uniform. The speed-up is greatest towards the hub. The net result is that CAWTs encourage a greater overall mass-flow as well as extract more energy per unit of mass-flow passing through the blade-plane than a conventional bare turbine.

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Dr G. Makaka GMakaka@ufh.ac.za
University of Fort Hare

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Primary author: Ms SHONHIWA, Chipo (University of Fort Hare)

Co-author: Dr MAKAKA, Golden (University of Fort Hare)

Presenter: Ms SHONHIWA, Chipo (University of Fort Hare)

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