Physical Models for the Shear and Yaw Effects on Horizontal Axis Wind Turbines

Due to the Earths boundary layer, Horizontal Axis Wind Turbines generally operate in yaw and shear flow. The effects of yaw have been studied by a variety of methods including simple BEM techniques as well as more sophisticated Free Vortex Wake and other NS based models. However, current models used in design rely on semi-empirical corrections in order to obtain meaningful results.

The PhD research aims at bringing a more physical insight into the problem of yaw and shear flow, combining experimental wind tunnel research with the development of better modeling tools. The research will focus on the effect of the near wake development in the induction and loads at the rotor disk.

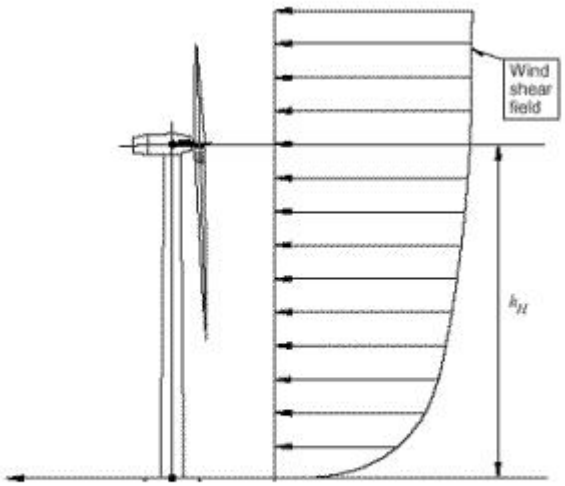

Figure 1: Horizontal Axis Wind Turbine operating in shear flow