



ANALYSING OF POWER QUALITY PROBLEMS OF WIND POWER GENERATORS

By

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Abstract

Wind power as a rule does not contribute to voltage in grids. Also, wind power very often is a source of voltage fluctuations and flicker. Furthermore, care must be taken to upkeep availability of networks more or less dependent on wind power by preventing the voltage from collapsing in conjunction with faults occurring in the grid.

The first wind power plant installed at Hambantota III Sri Lanka, 3MW was commissioned in early 1999. Alternating current transmission will turn out to be an economically and technically attractive option in many cases, and dynamic reactive power compensation will then be a natural part of the scheme.

The dominating kind of wind power generators are asynchronous, this since they are robust and cost effective. Induction generators, however, do not contribute regulation of grid voltage nor frequency, and they are substantial absorbers of reactive power. Ideally, they need to be connected to very stiff grids in order not to influence power quality in a detrimental way. This is not the case in reality. Quite on the contrary, wind power is usually connected for out in the grid, on sub transmission or distribution levels. The majority cases are 10-40kV.

The objective of the research is to analyze the problem of voltage and current harmonics, transient behavior, power fluctuation and reactive power consumption of wind power generators and modeling of wind turbines connected to the medium voltage distribution line of the grid where the other consumers are connected.

Often, Voltage regulation problems arise as a consequence of grids being made dependent on wind power, a matter of growing concern as wind power gets more important in the power balance.



To certain degree, Voltage Control problems caused by defect of reactive power in the grid can be, and is remedied by installation of fixed or mechanically switched shunt capacitors. This will not help on voltage fluctuations, however caused by varying output of wind generators. Regular voltage flicker is part of the picture, as well, caused by such phenomena as turbulent wind impact and so-called tower shadow effects.

DECLARATION

I hereby declare that this submission is my own work and that, to the best of my knowledge and behalf, it contains no material previously published or written by another person or material, which to substantial extent, has been accepted for the award of any other academic qualification of an university or institute of higher learning except where acknowledgment is made in the text.



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UOM Verified Signature

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ACRONYMS

CEB	-	Ceylon Electricity Board
COV	-	Coefficient of Variability
kV	-	Kilo Volt
MW	-	Mega Watt
WTG	-	Wind Turbine Generator
kA	-	Kilo Ampere
MVA	-	Mega Volt Ampere
KVAr	-	Kilo Volt Ampere Reactive
KW	-	Kilo Watt
RMS	-	Root Mean Square
THD	-	Total Harmonic Distortion
XLPE	-	Cross Linked Poly Ethylene
m/s	-	Meters Per Second



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