

# Calculation method of wind power generation efficiency

How to calculate PMSG wind generator?

Flowchart of calculation for PMSG wind generator 1. Wind speed  $V$  w m/s is taken as the input value, and then all state variables of WG will be calculated. 2. Wind turbine output power is calculated from Eq. 2.2.

How to calculate wind turbine output power?

1. Wind speed  $V$  w m/s is taken as the input value, and then all state variables of WG will be calculated. 2. Wind turbine output power is calculated from Eq. 2.2. Then, MPP (Maximum Power Point) produced by wind turbine is searched, resulting in the maximum wind turbine output power and the corresponding rotor speed.

How can we measure the efficiency of wind farms and wind turbines?

To the best of authors' knowledge, in the literature can be found only two studies measuring the relative efficiency of wind farms and wind turbines by using DEA method, and one study assessing the performance of wind farms by using stochastic frontier models.

How to calculate generator state variables in a wind farm?

Generator state variables are calculated using the d-q axis equivalent circuit. As one application of the presented methods, annual energy production and capacity factor of the wind farm can easily be evaluated by using wind speed characteristics expressed by Weibull distribution function.

How to determine the efficiency of an induction generator?

The efficiency of a generator is determined using the loss expressions described above. The input, output, and loss conditions of induction generator can be determined from rotational speed (slip). However, it is difficult to determine slip from wind turbine input torque.

How is wind speed used in a WG system?

In the methods presented in this chapter, wind speed is used as the input data, and then all state variables and conditions of the WG system, for example, wind turbine output, generator output, output power to the power grid, and various losses in the system etc., can be obtained.

To verify the validity of the suggested method, an experimental prototype was built and tested to control a 3-KW induction generator in a wind power generation system. The ...

The remainder of this paper is organized as follows. Factors affecting power generation performance and diagnostic methods are given in Section 2. Section 3 presents three examples based on actual wind field data.

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This paper presents a method to calculate various losses in wind turbine generation system (WTGS) as a

function of wind speed, which is based on the steady state analysis. Variable ...

$v$  = Wind speed (m/s)  $C_p$  = Power coefficient (efficiency)  $N_g$  = Generator efficiency;  $N_b$  = Gearbox bearing efficiency; Suppose we have a wind turbine with a blade radius of 5 meters, operating ...

The share of wind-based electricity generation is gradually increasing in the world energy market. Wind energy can reduce dependency on fossil fuels, as the result being attributed to a ...

Hence, the power coefficient needs to be factored in equation (4) and the extractable power from the wind is given by:  $P_{avail} = \frac{1}{2} \rho A v^3 C_p$  ... (5) 2 CALCULATIONS WITH GIVEN DATA We are given the following data: Blade ...

This paper presents a method to represent various losses in wind generator as a function of wind speed, which is based on the steady state analysis. By using the proposed method, wind ...

A method to calculate losses, power and efficiency of wind turbine generator systems with DFIG [15] reported the efficiency of a 5 MW DFIG to be just 50% near the cut-in ...

By using the presented method, wind turbine power, generated power, copper loss, iron loss, stray load loss, mechanical losses, converter ... 2.2.1 Outline of the Calculation Method ...

In the recent years, many wind turbine generation systems (WTGS) have been installed in many countries. However the electric power obtained from wind generators is not constant due to ...

In this Paper Analysis of Calculation Methods to calculate the losses and output power of wind turbine generator systems with using two types first one is Squirrel-Cage Induction Generator ...

