Analysis of generator operation at high wind temperature

Why are high-speed generators affecting wind turbine design?
This is the main reason high-speed generators have continued to have such an impact on turbine design, especially for onshore applications. Wind turbine generator failures are one of the primary reasons for increased operations and maintenance (O&M) costs and generation asset downtime.

Are high-temperature superconductor wires a good choice for wind turbine generators?
Significant progress in high-temperature superconductor (HTS) wires enables MW-rated generator designs with lower volume and mass. There are many studieson superconducting high-power synchronous wind turbine generators.

How do wind resource and grid interactions affect a turbine generator?
For instance,the main bearing,gearbox,and generator (drivetrain) components are interdependent,functioning in unison for efficient energy production. Hence,wind resource and grid interactions affecting the drivetrain impact the performance and reliabilityof the turbine generator.

Are superconducting high-power synchronous wind turbine generators feasible?
There are many studies on superconducting high-power synchronous wind turbine generators. In , direct-driven wind turbine generators with HTS winding were studied in general, and their advantages were demonstrated in comparison with conventional generators. The feasibility of a 5 MW HTS wind turbine generator (WTG) was discussed in .

Can a 10 MW HTS generator operate under partial load?
The field winding can be wound into separate loops with separate cryostats,hence even if one of the field windings has a fault,the generator can continue to operate under partial load. Furthermore,the design only requires 2.4 km of HTS tape at an operating temperature of 65 K,which is a fraction of other 10 MW HTS generator designs [8-10].

How is the efficiency of a generator calculated?
The efficiency of the generator is calculated as ~ 96%in the transient state,only the eddy current in iron parts and the copper losses. The AC loss of superconducting tapes during the first transport current activation is not taken into account and examined in the situation where DC flows HTS racetrack coils.

Efficiency and power output vary under different temperature differences; for instance, at a high temperature of 350°C, an efficiency of 4.5% and a power output of 1.47 ...

Some induction generators are also used in high-speed operation [4-6]. However, the induction generator has a complicated structure, a large amount of losses on the rotor and low efficiency [7]. Therefore, the ...

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1 INTRODUCTION. One of the biggest challenges the offshore wind energy sector faces is to reduce the cost of energy. The cost of energy is strongly affected by the ...

of the 20th year of operation is 40%. Figure 5: Wind turbine generator annual failure rate vs. operation years (data obtained from WinNER) The failure modes and contributing causes of ...

The turbine population for this analysis contains over 1800 doubly fed induction generators, partially rated converter wind turbines, and 400 permanent magnet generator fully ...

1 Introduction. As wind power is dominating the development of renewable energy and deriving the national "double carbon" target of the 14th Five-Year Plan, there is an urgent need to ...

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 ...

A detailed generator reliability analysis was conducted to evaluate the impact of turbine technology, design, manufacturing, maintenance strategies, and operational regime on failure ...

In this paper, the thermal performance of a 10-MW-class wind turbine-based high-temperature superconducting (HTS) synchronous generator is studied. The proposed generator is ...

The development of wind turbines generators FD has high engineering value, as follows: ... Lin et al. summarized the main causes of failures through statistical analysis of wind ...

The findings presented in this paper would be beneficial to the design, operation and protection of an HTS wind turbine generator. Original language ... Finite element analysis, High ...

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