表述中文
报告英文

Review – Part I:
Wind Energy Conversion Systems

1. How many categories are wind energy conversion systems (WECS) classified according to the capacity of power converters? Please clarify the features of them.

2. Please draw the system configuration of the variable-speed synchronous generator based wind energy conversion system, and describe the main functions of the key components.

3. What are the functions of the control scheme on the generator side for the synchronous generator based wind energy conversion system?

4. What is the working principle of zero d-axis current control scheme for synchronous generators in wind energy conversion system? Please clarify it.

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5. What is the working principle of maximum torque per ampere control for synchronous generators in wind energy conversion system. Please clarify it.

6. What are the functions of the grid-side converter for the synchronous generator based wind energy conversion system?

7. How to obtain the phase angle of rotor flux for synchronous generator and the phase angle of grid voltage. What are the functions of them for control of wind energy conversion system?

8. What are functions of the boost converter in the synchronous generator based wind energy conversion systems? Why are there distinct stator current harmonics and torque ripples using the boost converter?

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9. How to control the reactive power on the grid side of synchronous generator based wind energy conversion system?

10. What are differences of direct field-oriented control and indirect field-oriented control for induction generator based wind energy conversion system? Please clarify their features.

11. How to calculate the rotor flux angle θ_f with direct field-oriented control for induction generator based wind energy conversion system?

12. How many closed-loop controllers are used in the direct field-oriented control for induction generation based wind energy conversion system? What are their functions?

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13. How to obtain the rotor flux angle θ_f with indirect field-oriented control for induction generator based wind energy conversion system?

14. Please clarify the principle of direct torque control for the induction generator based wind energy conversion system.

15. Please compare the field-oriented control and the direct torque control?

16. How to determine the super-synchronous mode and sub-synchronous mode of double fed induction generator based wind energy conversion system. Please describe the power flow paths under super-synchronous mode and sub-synchronous mode respectively?

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17. How to find the equivalent resistance R_{eq} and equivalent impedance X_{eq} of rotor-side converter of double-fed induction generator? Please describe the steps.

18. What are the physical meaning of positive and negative R_{eq} from the power flow point of view?

19. What is the stator voltage oriented control (SVOC) of the doubly fed induction generator? How to use SVOC to regulate the active power and reactive power of the doubly fed induction generator?

20. Please clarify the startup process of doubly fed induction generator based wind energy conversion system.