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Thu-Mo-Po4.06-07 [45]: A Novel Thermal Network Model for Double Stator Brushless Doubly-Fed Generator With Cage-Barrier Rotor Based on Improved Mechanical Structure

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In order to improve the power density and efficiency of the existing generator for wind power generation, a novel double stator brushless doubly-fed generator with back-to-back cage-barrier rotor has been presented not long ago. However, the accident of toughing between inner stator and rotor inner cage-barrier has been found in the process of experiment for prototype, which results in large surface scratches on the surfaces of inner stator and rotor inner cage-barrier and a smell of burning. In order to solve this problem, the original mechanical structure has been improved in this paper. In addition, in view of the rich magnetic field harmonics existing in this new type of generator obtained by the electromagnetic field calculation, which results in generating large losses, and also because of its compact structure which makes the heat dissipation difficultly, it brings in the risk of high temperature. So it is necessary to analyze the heat transfer rules between internal structure parts before designing the cooling system subsequently. For this purpose, a novel thermal network model for the entire generator structure and thermal resistance calculation mathematical modals between special structural parts are proposed for temperature rise calculation based on the improved structure. Finally, the rationality of improved structure scheme and the correctness of the thermal network model are verified by finite element simulation and experimental study.

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