

## Comparison Study of Superconducting Generators with Multiphase Armature Windings for Large-scale Direct-drive Wind Turbines

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**Abstract** - To reduce the cost of energy and increase the reliability, are preferred, especially for the rising offshore wind generation. Compared to the traditional generators, superconducting generators offer many advantages, such as higher power density, higher efficiency at all load, less maintenance and so on. Therefore, they are regarded as the most promising candidates for large-scale direct drive wind generators with power of 10 MW and larger. For such generators, a great challenge are the full-power converters which are required as the interface with the grid. Multiphase armature windings are usually utilized to reduce the current stress of the power electronic devices. Two 12 MW nine-phase superconducting generators are designed. Both armature windings consist of three sets of 3-phase lap windings, and the primary difference is the phase difference between the adjacent phase sets. Using finite element method, the characteristics of the two generators are analyzed and compared from the view point of torque performance, eddy-current losses on the damping shell, and power conversion system.

**Keywords** - Multiphase armature winding. Superconducting field winding, Superconducting generator, Wind generation.

IEEE/CSC & ESAS EUROPEAN SUPERCONDUCTIVITY NEWS FORUM, No. 22, October/November 2012. ESNF Reference No.ST304 Category 6.

The published version of this preprint appeared in *IEEE Transactions on Applied Superconductivity* 23, 5201005 (June 2013).