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Superconducting Power Generators for Offshore Wind Turbines

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Offshore wind turbines, far away in the ocean, require light and compact power generators that can be easily shipped and installed. Superconducting power generators are a perfect option, which significantly reduce the mass of wind turbines and consequently result in substantial cost saving for installation and maintenance. However, excessive amount of superconductors are required that make superconducting power generators suffer from high cost and cooling and reliability issues. This presentation will introduce our latest research on an improved design of stackable superconducting power generators with a stationary superconducting field winding. This new design enables further mass reduction based on mechanical optimization of the rotation mechanism. Its stackable structure benefits on-site installation due to the flexible small modules that can be easily transported. We will also present our research work on the reliability of superconductors for offshore wind turbines. The change of superconductors after several cooling processes will be clearly demonstrated, which gains new knowledge essential to developing reliable superconducting power generators. This work is supported by the UK Research Council, under collaboration with Scottish Microelectronics Centre and Centre for Science at Extreme Conditions.

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