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Title: A Proposed Performance Index for Predicting the Best Location for a Voltage Ride Through Compensator

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Category: Marine Renewable Energy

Tidal currents and wind energy are effective and clean sources of supplying electrical loads, especially in remote and rural areas. Doubly Fed Induction Generator (DFIG) and direct drive permanent magnet synchronous generator (DDPMSG) are the most commonly used generators with tidal current turbines. Faults in the power system are the most common problem affecting the operation of the renewable energy power generators unless there is a ride through capability in the system. The impacts of the fault on the tidal current and wind power plant are affected by the location, the type of the fault, the settings of the protection relay, the generator type (if there is a ride through capacity or not), the overall characteristic of the network power system, the load distance from the generator, the grid configuration (radial or ring), the method of compensation, and the control algorithm employed in the electric power grid. During the fault, the characteristics of the DFIG and DDPMSG are changed. For the DFIG the rotor current is increased (the current may exceed 2-3 times the rated value). This will lead to increase the DC-link voltage (it may reach 2-3 times the rated value), the generator side converter tries to stabilize the DC-voltage which will lead to increase the grid side converter current (may reach up to 57% of the rated value), and finally the turbine will be exposed to an oscillating torque which will reduce the turbine life expectancy. The separation of the turbine from the grid during the fault is not preferred as it may lead to voltage collapse, so there must be a fault ride through compensator to overcome these problems. The location of the voltage ride through compensator is very important. The aim of this paper is to propose a performance index for predicting the best location for the voltage ride through compensator during any faulted conditions. The results of hundreds of runs of the simulation program show the importance of the proposed performance index.