A novel optimization method of HVDC network access for offshore wind farms

Shuxin Tian[1], Feng Zhu[1], Xijun Yang[2], Hong Fan[1], Wenyuan Xiao[1], and Zou Bin[1]

[1]Shanghai University of Electric Power
[2]Shanghai Jiao Tong University

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Abstract

Offshore wind power is exhibiting an escalated development trend in scaling, clustering, and deployment in deep-sea. Due to the decentralized distribution of offshore wind farms and the large number of onshore optional access points, the selection of a feasible topology solution is challenging and difficult. Therefore, a novel topology optimization method for multiple offshore wind farms integrated with HVDC is proposed. Three indexes are presented in this paper: HVDC submarine cable line investment cost index, HVDC short-circuit ratio equalization index, and HVDC submarine cable network topology robustness index. These indexes represent the economy, safety, and robustness of the system. Secondly, the optimization model for the offshore wind power HVDC transmission network topology is constructed by combining the indicators mentioned above and HVDC operation constraints. Finally, the effectiveness and practicality of the algorithm is demonstrated using the example of an 8-node system containing land and sea switching stations.

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