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Study for an Optimal Cable Connection within an Inner Grid of an Offshore Wind Farm

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Abstract : The offshore wind farm needs to be designed carefully considering economics and reliability aspects. There are many decision-making problems for designing entire offshore wind farm, this paper focuses on an inner grid layout which means the connection between wind turbines as well as between wind turbines and an offshore substation. A methodology proposed in this paper determines the connections and the cable type for each connection section using K-clustering, minimum spanning tree and cable selection algorithms. And then, a cost evaluation is performed in terms of investment, power loss and reliability. Through the cost evaluation, an optimal layout of inner grid is determined so as to have the lowest total cost. In order to demonstrate the validity of the methodology, the case study is conducted on 240MW offshore wind farm, and the results show that it is helpful to design optimally offshore wind farm.

Keywords : offshore wind farm, optimal layout, k-clustering algorithm, minimum spanning algorithm, cable type selection, power loss cost, reliability cost
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