**Reactive Power Compensation Strategies for Long Distance Submarine Cables Considering Electrothermal Coordination**

Abstract: Long-distance high voltage alternating current (AC) submarine cables are widely used to connect offshore wind farms and land power grids. However, the transmission capacity of the submarine cable is limited by the capacitive charging current. This paper analyzes the impacts of reactive power compensation in different positions on the current distribution on long-distance submarine cable transmission lines, and tests the rationality of the existing reactive power compensation schemes based on electrothermal coordination (ETC). Research shows that compensation at the sending end has obvious impacts on current distribution along the cable, and the maximum current occurs at the sending or receiving end. Moreover, the reactive power compensation at sending end will reduce the current at receiving end of the line. On the contrary, it will increase the current at sending end. Compared with the directly buried laying method of the submarine cable in the landing section, the cable trench laying method can increase the cable ampacity of the landing section and reduce the reactive power compensation capacity at the sending end. The ampacity is the current representation of the thermal limits of the cable. ETC exploits the cable ampacity to coordinate current distribution on transmission lines under existing reactive power compensation schemes, thus optimizing the reactive power compensation schemes and avoiding the bottleneck point of cable ampacity.

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