

考虑海洋影响的直流输电单极大地运行时变压器中性点直流电流研究

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摘要

考虑海洋影响的直流输电单极大地运行时变压器中性点流过的直流电流与陆地土壤模型计算的结果有很大不同。海洋介质的面积大于陆地而电阻率远小于陆地土壤, 它对附近大地电位的分布有影响, 离海洋越近, 陆地电位降得越快, 进入海洋层后电位迅速降到零电位附近。根据500 kV电网实际模型, 考虑土壤模型和海洋影响后对直流电流的分布进行仿真比较表明, 处于距离接地极较远的海边厂站变压器中性点会流过较大的直流电流。这是由于海洋造成电站电位降低, 而导致进入交流电网中的直流电流较多地从低电位的厂站流出交流系统。仿真结果很好地解释了岭澳、大亚湾核电站变压器中性点流过较大直流电流的现象。

关键词 [直流输电](#); [直流电流](#); [变压器中性点](#); [直流偏磁](#); [接地](#)

分类号

Study on DC Current through Transformer Neutrals Caused by Ground Return Operation Mode of HVDC System with Sea Influence Considered

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Abstract

The calculation results of DC currents through transformer neutrals of HVDC system operated in monopole-ground return mode with the influence of sea considered are evidently different from those calculated by terrestrial soil model. As a kind of medium, sea is larger in area and its resistivity is far less than that of terrestrial soil, so the resistivity of sea influences the distribution of ground potential. The more the land close to the sea, the faster the ground potential decreases, and when the ground extends into the sea, the ground potential is near to zero over there. According to actual model of 500kV power grid, the DC current distribution is simulated and compared while both soil model and influence of the sea are considered. Simulation results show that larger DC currents will flow through transformer neutrals, which are near the seaside and far from the ground pole of HVDC system. The reasons of this phenomenon lies in that the influence of sea makes the substation potential decreased, so more DC currents entered into AC power network will flow outwards from AC network via substations with low ground potential. Simulation results well explain the phenomena that larger DC currents flow through transformer neutrals in Ling'ao and Daya Bay nuclear power stations.

Key words [HVDC power transmission](#); [DC current](#); [transformer neutrals](#); [DC bias](#); [grounding](#)

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