

Study on AC Interference Law of High Voltage AC Cable to Submarine Pipeline and Safe Distance

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Abstract In recent years, due to the large-scale construction of wind power and shore power projects, the laying of underwater high-voltage alternating current (AC) cables has been increasing annually, often running parallel to nearby underwater pipelines and forming a "common corridor." This arrangement generates alternating current induced voltage and current on the pipelines, putting them at risk of AC interference. While substantial research has been conducted on AC interference patterns for onshore oil and gas pipelines, there is a lack of systematic study and understanding regarding AC interference issues for underwater pipelines. How to understand the AC interference law of high-voltage AC cables to submarine pipelines and determine the safe distance has become an urgent demand in practical production. Based on this, this paper establishes a calculation model for AC interference on underwater pipelines caused by high-voltage AC cables using CDGES software. Through simulation calculation, the influence law of many factors such as parallel distance between AC cables and pipelines, parallel length, cable load current, anticorrosive coating resistivity and longitudinal pipeline resistance per unit length on AC interference parameters of pipelines was investigated. Based on the principles of electromagnetic induction and AC circuits, the safe distances avoiding AC corrosion under different parallel lengths and load currents were discussed, which can provide a reference for the evaluation of AC interference of submarine pipelines and the selection of submarine routing.

Keywords AC interference; numerical simulation; submarine pipeline; interference law; parallel length with maximum AC interference

Reference

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