Numerical Simulation on Cathodic Protection Potential Distribution Along Horizontal Directional Drilling Pipe

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Abstract As the use of directional drilling to lay pipelines in the oil and gas industry becomes more widespread, there is an urgent need to effectively evaluate the cathodic protection level of the pipelines during directional drilling operations. This article takes the example of a horizontal directional drilling crossing section and a pipe gallery with connected protection for underground pipelines, by collecting and testing the basic information of the pipeline and establishing numerical simulation models, designing the device for evaluating the polarization characteristics of the drilled pipeline, when the pipe burial depth is 1m, there is an oxygen diffusion limit zone in the polarization curve, when the pipe burial depth is more than 5m, the soil oxygen content is very low, the sample polarization curve is the oxygen diffusion limit zone, the polarization characteristics of the sample change as the pipe burial depth increases, the cathodic protection boundary conditions of different burial depths are determined. Through numerical simulation calculation and analysis of the cross-sectional linked protection effect and influencing factors, the law of the effect of different forms of sacrificial anode

bed position and number on the cross-sectional protection effect is obtained. This study provides a reference for future cathodic protection design.

Keywords Directional drilling pipeline, Numerical simulation, Boundary conditions, Cathodic protection

Reference

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