

A Study on the Evaluation Method for the Operating Status of Overhead Transmission Lines Based on Analytic Hierarchy Process (AHP)

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Abstract

To address the difficulty of dynamically assessing overhead transmission lines under varying meteorological conditions through manual inspections and drone monitoring, this study proposes an evaluation method for the operating status of overhead transmission lines based on the Analytic Hierarchy Process (AHP). A mathematical model based on AHP is first established to perform weighted processing of five meteorological factors, generating a comprehensive meteorological dataset. A simulation model for the LGJ-300/70 type conductor is then developed under the temperature field, where temperature distribution during operation is determined based on different meteorological data. Stress variations are observed, and evaluation criteria are established by calculating displacement deviations in the two-dimensional transmission line model. The transmission line is considered to be in a normal operating state when the maximum displacement deviation is ± 0.63 mm. This demonstrates that the AHP-based evaluation method can effectively enable dynamic assessment of the operating status of overhead transmission lines.

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