Study on Galloping Characteristics of Eight-Bundle Transmission Lines Considering Strain Insulator Strings (Postprint)

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Abstract

Conductor galloping has long been a critical factor affecting the winter safety of transmission lines. Taking crescent-shaped iced 8-bundle transmission lines with tension insulator strings as the research object, and using FLUENT and ABAQUS as platforms, the aerodynamic characteristics and galloping stability of conductors were analyzed, the torsional stiffness and dynamic characteristics of bundle conductors were studied, and the influences of different insulator string connection configurations, wind speeds, and initial wind attack angles on galloping characteristics including amplitude, displacement time history, and motion trajectory were investigated. The calculation results indicate that, compared with single strings, multiple tension insulator strings increase the torsional stiffness of 8-bundle transmission lines, significantly alter the low-order natural frequencies, and make vertical and torsional vibrations less prone to coupling; multiple tension insulator strings exert a greater influence on the galloping characteristics of transmission lines than single strings, significantly changing the galloping pattern and increasing the vertical galloping amplitude; the galloping amplitude of transmission lines increases with wind speed; and the galloping characteristics vary noticeably with different initial wind attack angles, which is consistent with the calculated galloping stability ranges. The research results provide guidance for the analysis of transmission line galloping characteristics and the investigation of galloping control methods.

Full Text

Preamble

The source manuscript is severely corrupted, consisting exclusively of mathematical placeholders devoid of substantive, recoverable content. This corruption

prevents the production of a meaningful academic translation, as the underlying textual material necessary for interpretation has been lost or degraded beyond retrieval. Any mathematical expressions that may have originally accompanied the text appear to have been similarly compromised during document transmission or processing. Consequently, this preamble serves to document the state of the source material and to explain the absence of translated content. Researchers interested in the original findings should contact the authors directly to obtain a verifiable, uncorrupted version of the manuscript for proper translation and analysis.

Note: Figure translations are in progress. See original paper for figures.