

A theoretical framework for modifying the equivalent static wind load of transmission lines considering the location updating effect

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ABSTRACT

Transmission lines will deviate from the initial state under intense wind loads. The responses may be distorted if an invariant wind load is always adopted, ignoring the location updating (LU) effect. This study proposes a framework to quantify the LU effect on equivalent static wind load (ESWL) and wind-induced responses. Using covariance integration and gust response factor, ESWL is modified for an actual 500kV power project, and a simplified method is developed by a rigid pendulum model. The mean wind load with the LU effect is magnified markedly, whose amplification factor reaches 1.16. The lateral reaction grows as wind speed increases and shall be paid attention to in strong wind areas. Moreover, sensitivity analysis proves that the LU effect hardly affects gust response factors. The simplified method of ESWL only has a relative error of -0.45% and exhibits excellent robustness to the height difference.

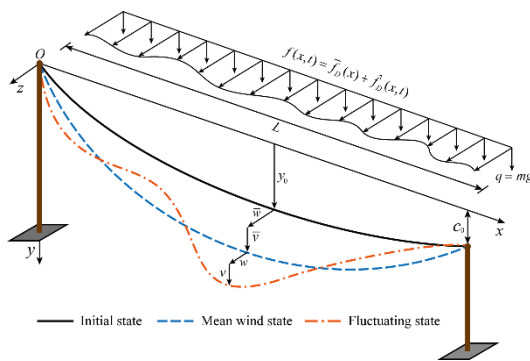


Fig. 1 Wind-induced response model

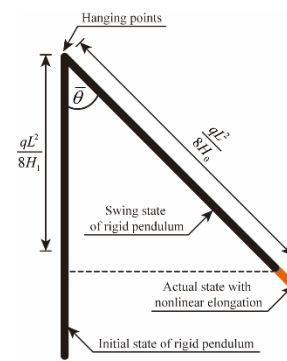


Fig. 2 Rigid pendulum model

REFERENCES

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