

Machine-Learning Based Forecasting Of Thunderstorm Winds Acting On Sutong Cable-Stayed Bridge

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Thunderstorm wind is an extreme wind event that has a great impact on structural safety of long-span bridges. It consists of a sudden change of wind velocity and direction due to a downdraft of cold air that touches the ground and then spreads at ground level. The short-term forecasting of thunderstorm winds is a critical issue in engineering communities. This paper presents a machine-learning based forecasting of thunderstorm winds based on the monitored data at the site of Sutong Cable-Stayed Bridge. In the presented approach, the forecasting using the artificial neural network is enhanced with dual modifications, in which the first modification remedies the underestimation by correcting the error linearly correlated to the measured wind velocity, while the second modification compensates the residual error negatively proportional to the wind velocity after the first modification. The efficacy of this approach is verified via case studies concerning the one-step and multi-step ahead predictions. The satisfied results indicate the effectiveness of the presented approach in the short-term forecasting of thunderstorm winds.