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## Prediction of Temperature Induced Deformation of a Supertall Structure Using Structural Health Monitoring Data

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For supertall structures, temperature is one of the most significant factors to affect the structural responses. For example, the field monitoring exercise of Guangzhou New TV Tower (GZNTVT) has shown that the diurnal movement at the top of the main structure due to variation of temperature could be as large as 10 cm in magnitude, which is even larger than the typhoon-induced displacement. Therefore, monitoring and understanding the temperature effects on the super-tall structure are of practical importance. A long-term structural health monitoring (SHM) system consisting of over 700 sensors of sixteen types has been implemented on the GZNTVT for real-time monitoring of the structure at both construction and service stages.

For the supertall structures like GZNTVT, the non-symmetry, non-uniform, and twisted geometry configuration makes it not appropriate to develop a one-dimensional or two-dimensional finite element model like bridges to obtain the accurate temperature distribution. Consequently the temperature induced responses cannot be obtained. In this study, a method to predict temperature induced deformation of the supertall structures by using the measured strain data obtained from its SHM system is proposed. To verify the effectiveness, the predicted displacements are compared with the GPS-measured displacements. The proposed method can be extended to other supertall structures and bridges.

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**Ключевые слова:**

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GZNTVT and its SHM system

Prediction of temperature induced deformation from measured strain data

Comparison between the predicted and GPS-measured displacement of GZNTVT

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Acknowledgements