

## **Measuring displacement of a bridge using multi-channel image processing techniques**

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### **Summary**

Measuring the displacement of a flexible bridge is difficult particularly on a long span bridge. In this study, real-time displacement measurement of a long span bridge was carried out using digital image processing techniques which require a target recognition algorithm, projection of the captured image, and calculation of the actual displacement using target geometry and the number of pixels moved. To measure the displacement of a bridge from a distant location which can be regarded as a fixed reference point, a novel image processing method has been devised. By measuring the same target with two independent cameras placed in a line, a redundant displacement value is obtained and can be utilized for calculating the angular displacement of the intermediate camera position. Then, a relative displacement of another distant target can be measured by the intermediate camera. Finally, the absolute displacement of the final target can be calculated by the angular displacement and relative displacement data. For the purpose of verification, a field experiment has been carried out on a suspension bridge.