

## **Structural displacement estimation by fusing accelerometer and vision camera**

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### **ABSTRACT**

A displacement estimation method is developed for civil infrastructure by combining measurements from collocated accelerometer and vision camera. Using an adaptive multi-rate Kalman filter, the proposed method integrates high-frequency acceleration measured by an accelerometer and low-frequency displacement captured by a vision camera for static/dynamic displacement estimation. The proposed method offers following advantages: (1) displacement estimation without a rigid reference support and artificial targets, and (2) automatic estimation of the scale factor, which relates the displacement in pixel unit to a physical length unit. The performance of the proposed method was examined through lab-scale tests. The results show under 3 mm RMSE with respect to a reference displacement measurement (LDS).

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