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Comparison of Optimal Sensor Placement methods for Bayesian factor based damage detection of bridges

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【Background】

Due to aging of existing bridges, research on Structural Health Monitoring (SHM) has been attaracting lots of attention. However, the quality of data input maybe limited due to limited number of sensors resulting from cost situation. Thus, Optimal Sensor Placement (OSP) methods have been also a great deal of interest

【Objective】

With past research that developed a damage detection method using Bayesian Factor (BF) as criteria, this study aims to compare OSP methods to find which OSP method would suit the damage detection method best in minimizing the number of sensors used.
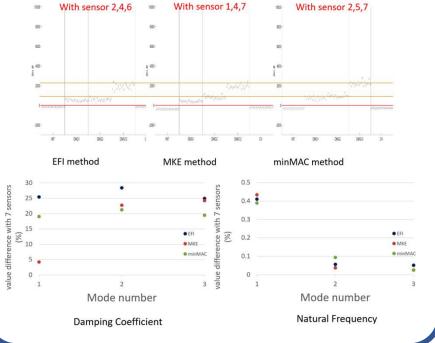
【Approach】

By conducting vehicle running test on model bridge with several damage conditions and temperature conditions, the acceleration data of the bridge is collected with 7 sensors. OSP methods are conducted using the data to find which sensors should be eliminated, and damage detection using BF is conducted using the data from the reduced number of sensors to find which reduced sensor configuration from OSP methods suits best for the damage detection method.

【Publication plan】

・None at the moment

【Results】

Of the three OSP method tested, minMAC method proved to be best for the damage detection method using OSP

With sensor 2,4,6 — EFI method

With sensor 1,4,7 — MKE method

With sensor 2,5,7 — minMAC method

Damping Coefficient

Natural Frequency

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