Damage detection utilizing reconstructed system matrix

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【Background】

When using finite element software to simulate complex projects, the simulation results obtained are often not completely consistent with the actual situation of the structure. There are differences between the input model parameters and the actual situation, and there are too many things such as noise which is impossible to join the FE calculation. However, mathematical models can only consider probabilities and ignore details. The combination of FEM and mathematical model is expected to solve this problem.

【Objective】

In this study, finite element models will be used to simulate the behavior of laboratory bridges under different conditions, and the analysis results will be compared with the acquired results. Use mathematical methods to match the data of the two, then it is possible to infer the health of the structure from the current data and do the model updating.

【Approach】

This study change the temperature and damage, and conduct free vibration and vehicle induced vibration experiments. Establish the FE model in abaqus, and adjust the model parameters so that the analysis results can be generally consistent with the experimental ones. Then extract key parameters from the analysis results to participate in the establishment and update of the mathematical model. Then using Bayesian theory to simulate the health of bridge.

【Publication plan】

・H31 JSCE Annual Conference

【Results】

The two sets of data show the same trend, but slightly different details. The effects of temperature changes are amplified at the damage, and the effects of the two are also coupled to each other.