

Risk-based decision making using structural health monitoring information

Daigo Kawabe

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【Background】

Although the quantitative information about the state of the structure is obtained by structural health monitoring (SHM), there is not a practical way of proposing the best decision for structure authorities once the output from SHM would be obtained.

【Objective】

This study aims to realize one-stop monitoring that propose the best actions from the output of SHM based on decision theory. Especially, this study investigates the scour monitoring of railway bridge pier as a case study. The expected utility values when certain actions are taken are calculated from identified frequency of bridge pier in real time, and the best action is determined. Research of this academic year considers improvement of the accuracy for decision making by deploying the numerical simulation.

【Approach】

Finite Element Model is built to estimate the scour depth around the target bridge pier where identified frequency of pier is obtained. Soil spring stiffnesses are updated by use of Bayesian model updating method (BMUM) based on the observed frequencies. Then, the relationship between identified frequencies and depth of the scouring is estimated by considering the effect of the footing.

【Publication plan】

• 2023 JSCE Annual Conference

【Results】

Based on the results in sensitivity analysis, rotational spring stiffness on the FEM were updated by BMUM. Furthermore, this study assessed the relationship between depth of the scour and frequency of the pier.

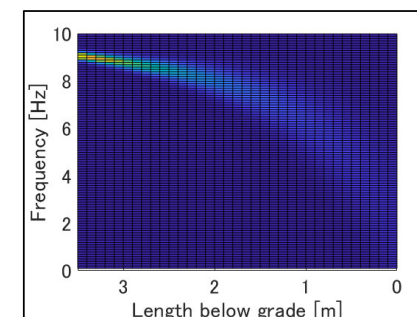


Diagram of the relationship between depth of scour and natural frequencies