



# Probabilistic scour assessment and soil stiffness identification of railway bridge pier from ambient vibration monitoring

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## 【Background】

In recent years, possibility of scour of bridge piers is increasing due to unprecedented heavy rainfall and reduction of sediment discharge. When the water surface swelling and river speed increasing, erosion of river bed also increases, and as a result the stability of the bridge foundation will be deteriorated in a short time and lead to the inclination or collapse of the bridge. The impact test on the railway bridge pier is a promising scour detection method focusing on changes in frequencies. However, it is laborious and inapplicable for the real time monitoring during heavy rains to make a proper decision on the train operation.

## 【Objective】

The first objective of this research is to propose a scour assessment method utilizing the vibration data collected from the ambient vibration monitoring on railway bridge piers. The second objective of this study is to identify the change of soil stiffness utilizing the identified frequency of the target pier through scour monitoring to timely know about the health condition of the soil part around or below the pier.

## 【Approach】

A bridge under operation is monitored as a case study. By utilizing probability density function (PDF) of the observed target frequency in both normal and swollen period, a concept of stochastic warning index (SWI) is proposed with five calculation methods. By model updating utilized combination of Artificial neural network and Genetic algorithm (ANN-GA), relationship between target frequency and scour depth is obtained.

## 【Publication plan】

• ICOSAR 2022

Keywords: Remote monitoring; Scour assessment

## 【Results】

- ① Feasibility of the proposed SWI is proved.
- ② The relationship between scour depth and target frequency is obtained.

