



# Data-driven pattern recognition in structural health monitoring

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## 【Background】

For vibration-based SHM, uncertainty heavily exists in the process and may cause a masking effect to damage signal, which introduced huge difficulty for anomaly detection.

Among various kinds of uncertainty, environmental and operational variables (EOVs) induced variation is considered to be an important part as well as identification uncertainty.

## 【Objective】

Not focusing on the identification uncertainty, this research mainly works on addressing the EOVs related variation in identified modal parameters or other measurements like deformation, etc.

By finding a proper way to model the EOVs effect under the reality of coupling and deficient measurements, the uncertainty in this process will be reduced in some extent, and further improve the accuracy and reliability for anomaly detection.

## 【Approach】

By utilizing proper methods for modal identification (like BAYOMA), mathematical modeling (like various regression approaches) and pattern recognition (like PCA, statistical test, ANN) in the data monitored under operational condition, the effectivity and uncertainty in considering EOVs influence with these methods can be investigated. Further, methods for anomaly detection based on stable and robust modeling techniques are discussed.

## 【Publication plan】

- 7th International Symposium on Reliability Engineering and Risk Management (ISRERM2020).
- 7th Asian-Pacific Symposium on Structural Reliability and Its Applications (APSSRA 2020).

## 【Results】

The effects of different regression methods in modeling temperature-induced variation of identified modal frequencies are investigated.

