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## Damage Detection Index Based on Statistical Inference and PCA

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This paper is focused on the development of new estimators propounding if someone statistical law could estimate or infer a system without damage knowing its reliability. This new measurement considers each experiment, and consequently, each projection to the PCA model as a random variable. An in-depth statistical analysis is performed for SHM. PCA projections are obtained from the undamaged structure (baseline projection). If these projections are considered as the set of possible results (population), then the new projections from the current structure (healthy or not) are defined as random samples. Therefore, the probability distribution of the baseline projection can be found. This new distribution can make an inference about the state of the structure and determine if there is damage in it. Consequently, the relative likelihood of each new projection is determined. If the new projection is strongly related with the population, then the structure is healthy. Otherwise, the relation indicates the damage.

**Ключевые слова:**

### Содержание.

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