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Structural Health Monitoring During Progressive Damage Test of S101 Bridge

For the last decades vibration based identification of damage on civil engineering structures has become an important issue for maintenance operations on transport infrastructure. Research in that field has been rapidly expanding from classic modal parameter estimation using measured excitation to modern operational monitoring. Here the difficulty is to regard to the specific environmental and operational influence to the structure under observation. In this paper, two methods accounting for statistical and/or operational uncertainties are applied to measurement data of a progressive damage test on a prestressed concrete bridge. On the base of covariance driven Stochastic Subspace Identification (SSI) an algorithm is developed to monitor and automatically compute confidence intervals of the obtained modal parameters. Furthermore, a null space based non-parametric damage detection method, utilizing a statistical $x2$ type test is applied to the measurement data. It can be shown that for concrete bridges the proposed methodology is able to clearly indicate the presence of structural damage, if the damage leads to a change of the structural system.

Ключевые слова:

Содержание.
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