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Health Monitoring of Metsovo Bridge Using Ambient Vibrations

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A real-time online structural health monitoring system for the Metsovo bridge, the highest R/C bridge of the Egnatia Odos Motorway in Greece, is outlined and then used to develop high fidelity dynamic finite element models for the bridge-foundation-soil system. Operational modal analysis software is used to obtain the modal characteristics of the bridge for the various sets of available vibration measurements during different construction phases of both the left and right bridge branches. These modal characteristics are then used to construct and calibrate detailed finite element models of the bridge, consisting of solid elements. A multi-objective structural identification method is used for estimating the parameters of the finite element structural models based on minimising the modal residuals. The method results in multiple Pareto optimal structural models with variability that depends on the fidelity of the model class employed and the size of measurement errors. The identified Pareto models are used for checking design assumptions, for exploring the adequacy of the different classes of finite element models, for identifying soil-structure interaction effects, and for estimating the response prediction variability.

Ключевые слова:

Содержание.

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