# EFFECTS OF SYSTEM IDENTIFICATION ON THE APPEARANCE OF MULTIPLE SOLUTIONS IN MODEL UPDATING

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## ABSTRACT

Finite element models are idealistic representations of actual structures. These models need to be updated in order to better represent the behavior of an existing structure. Model updating is performed based on experimental data collected from the structure and it is usually performed by minimizing an objective function that represents the error between the experimental data and numerical data created with the numerical model. It has been shown that multiple solutions may arise in this objective function, depending upon the complexity of the structural model, the amount of variables involved in the updating process, and the uncertainties in the system identification part. This paper focuses on studying the effects of the uncertainties in the system identification process on the appearance of multiple solutions in model updating. The paper also shows that under some specific conditions a local minimum of the objective function could provide a better physical representation of the structure than the global minimum. The paper is limited to model updating based on dynamic characteristics but the same principles can be applied to data captured from static tests. Different sensor configurations and errors on the natural frequencies and mode shapes are used in order to show that the appearance of multiple solutions is largely influenced by the system identification uncertainties.