

Numerical method for detecting damage in a steel-concrete composite beam by finite eigenvalue measurements

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In this talk, we present a numerical method for an inverse problem of detecting damage in a composite system formed by the connection of a steel beam and a reinforced concrete beam. The small vibrations of the composite beam are governed in space by two second order and two fourth order differential operators, which are coupled in the lower order terms by two coefficients which express the shearing and axial stiffness of the connection. Our inverse problem is to determine these stiffness coefficients by using finite eigenvalue data. We recast the inverse problem as a constrained variational issue and an iterated method based on the projected gradient method is proposed for finding the numerical solution of the minimizing problem. Suitable clip-off and mollifier operators are introduced in order to describe the constrained conditions. The effectiveness of method is tested on the basis of an extensive series of numerical experiments.