TOTAL VARIATION REGULARIZATION APPLIED TO DAMAGE IDENTIFICATON

Fernando A. Rochinha* and DanielA. Castello
Department of Mechanical Engineering
Federal University of Rio de Janeiro , RJ, Brazil
faro@mecanica.coppe.ufrj.br*, castello@mecanica.coppe.ufrj.br

Abstract

It is needless to emphasize the importance of damage detection techniques and health monitoring in aerospace, civil and mechanical engineering. It is essential to determine the safety and reliability of their systems and structures. Based on experimental modal analysis and signal processing techniques, monitoring and interpreting changes on structural dynamic measurements can be considered as a quite promising approach for damage identification and health monitoring. Here, a time domain damage identification method, combining a continuum damage modeling and an optimal control formulation is introduced. It builds on the same damage parameterization that has been used before by the authors [1-2] and it can be also considered a model updating, but represents a non-modal detection technique.It is assumed that there is set of experimental data available , probably noisy, which can be used as the basic information for the estimation of the parameters . The idea is to minimize a suitable error function which consists of the norm of the difference between the measured data and the data obtained from the system model for the same input excitation. Due to the presence of noise and the ill-posedeness of the proposed formulation, a regularized formulation is required. Here, due to the existence of sharp gradients in the vicinity of damaged regions, Total Variation regularization [2] is adopted.

References

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