

055. NUMERICAL INVESTIGATION ON MULTICLASS PROBABILISTIC CLASSIFICATION OF DAMAGE LOCATION IN A PLATE STRUCTURE

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Abstract

The present study is devoted to the problem of damage localization by means of data classification. Commercial finite elements program ANSYS is used to make a model of a cantilevered composite plate equipped with 11 strain sensors. The plate is divided into 18 zones and for data classification purposes each of these zones houses 9 points at which a point mass with a magnitude of 5 % and 10 % fraction of plate mass is applied. At each of these points a numerical modal analysis is performed in which first 4 natural frequencies and 11 strain reading is extracted for each point. Point mass, similar to damage, causes local changes of stiffness. The data of strain for every point is an input for classification procedure involving 2 methods – k – nearest neighbors and decision trees. Classification model is trained and optimized by fine-tuning the key parameters for both algorithms. Finally, 2 new query points are simulated (by applying the point mass) and subjected to classification in terms of assigning a label of one of 18 zones of the plate, thus localizing these points in terms of one of 18 zones. Damage localization results are compared for both algorithms and are in good agreement with the actual positions of application of point load.

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