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# Damage Identification in Structures by Means of Thermographic Methods

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The prediction of location and size of any kind of damage in existing engineering structures is of great importance from the point of view of their serviceability and safety. Visual inspection and extensive testing can be employed to locate and measure the degradation of structure using the wide class of non-destructive techniques. In the present paper, the detection of surface, subsurface or internal cracks will be performed on the basis of analysis of thermal response of structure, and in particular by the measurement of temperature distribution along its external boundaries. In order to increase the number of available measurement data, the thermal multi-loading case is considered. On the basis of results of measurements, an inverse heat transfer problem is formulated and solved. In order to determine the location, orientation and size of single or multiple defects, the finite element model of a structure is constructed and used to predict temperature distribution, next used in the identification procedure. The novelty of the present approach is based on application of path independent sensitivity integrals used to detect position, orientation and size of the defect. Both steady and transient thermal fields can be used in identification procedure. Some numerical examples of defect identification in two-dimensional disks will be presented in order to justify the presented approach.

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