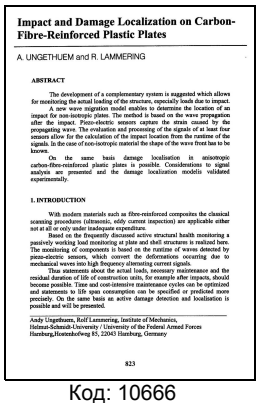

Impact and Damage Localization on Carbon-Fibre-Reinforced Plastic Plates

A. UNGETHUEM and R. LAMMERING

ABSTRACT

The development of a complementary system is suggested which allows for monitoring the actual loading of the structure, especially loads due to impact.
A new wave migration model enables to determine the location of an impact for non-isotropic plates. The method is based on the wave propagation after the impact. Piezo-electric sensors capture the strain caused by the propagating wave. The evaluation and processing of the signals of at least four sensors allow for the calculation of the impact location from the runtime of the signals. In the case of non-isotropic material the shape of the wave front has to be known.
On the same basis damage localisation in anisotropic carbon-fibre-reinforced plastic plates is possible. Considerations to signal analysis are presented and the damage localization modelis validated experimentally.

1. INTRODUCTION

With modern materials such as fibre-reinforced composites the classical scanning procedures (ultrasonic, eddy current inspection) are applicable either not at all or only under inadequate expenditure.
Based on the frequently discussed active structural health monitoring a passively working load monitoring at plate and shell structures is realized here. The monitoring of components is based on the runtime of waves detected by piezo-electric sensors, which convert the deformations occurring due to mechanical waves into high frequency alternating current signals.
Thus statements about the actual loads, necessary maintenance and the residual duration of life of construction units, for example after impacts, should become possible. Time and cost-intensive maintenance cycles can be optimized and statements to life span consumption can be specified or predicted more precisely. On the same basis an active damage detection and localisation is possible and will be presented.

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Ключевые слова:

Содержание.