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DATA ANALYSIS CHALLENGES IN STRUCTURAL HEALTH ASSESSMENT USING MEASURED DYNAMIC RESPONSES

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The authors and their research team developed several nondestructive inspection-based structural health assessment and monitoring procedures to detect defect at the local element level, representing structures by finite elements. They are based on time domain nonlinear system identification-based concept. By tracking changes in the identified system parameters of the elements, the location and severity of defect can be assessed. To increase their implementation potential, only limited numbers of very short durations measured noise-contaminated acceleration time-histories are used in the identification algorithms. Numerous multi-disciplinary advanced data processing schemes used in developing these algorithms are briefly discussed. Presence of uncertainties in data processing and mitigation strategies are emphasized.

Keywords: Structural health assessment; nonlinear system identification; filtering techniques.

1. Introduction

Structural health assessment/monitoring (SHA/M) have recently become an international multi-disciplinary research topic. Infrastructures are expected to deteriorate during the normal aging process or when they are exposed to severe natural events like damaging earthquakes, high wind, etc. or subjected to manmade events