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**DEVELOPMENT OF STRUCTURAL HEALTH
MONITORING TECHNIQUES USING
DYNAMICS TESTING**

by

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ABSTRACT

Today's society depends upon many structures (such as aircraft, bridges, wind turbines, offshore platforms, buildings, and nuclear weapons) which are nearing the end of their design lifetime. Since these structures cannot be economically replaced, techniques for structural health monitoring must be developed and implemented. Modal and structural dynamics measurements hold promise for the global non-destructive inspection of a variety of structures since surface measurements of a vibrating structure can provide information about the health of the internal members without costly (or impossible) dismantling of the structure. In order to develop structural health monitoring for application to operational structures, developments in four areas have been undertaken within this project: operational evaluation, diagnostic measurements, information condensation and damage identification. The developments in each of these four aspects of structural health monitoring have been exercised on a broad range of experimental data. This experimental data has been extracted from structures from several application areas which include aging aircraft, wind energy, aging bridges, offshore structures, structural supports, and mechanical parts. As a result of these advances, Sandia National Laboratories is in a position to perform further advanced development, operational implementation, and technical consulting for a broad class of the nation's aging infrastructure problems.

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