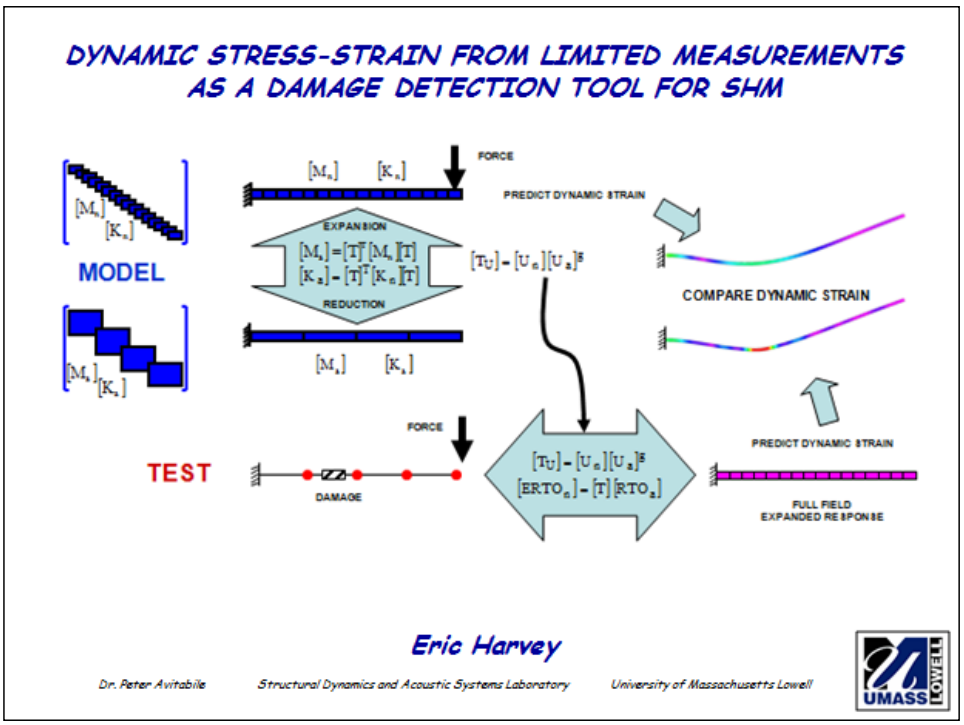
MASTER'S THESIS – ERIC HARVEY

DYNAMIC STRAIN DETERMINATION FROM LIMITED MEASUREMENTS FOR SHM APPLICATIONS



Complex composite structures, that are subjected to appreciable externally induced loading, will fatigue and fail over time. For many structures, imminent failure and loss of structural integrity is not externally apparent. Typical failure occurs at the interfaces between the structure's surface and internal ribs or stiffening members. Conventional approaches for proper validation of full-scale exterior dynamic behavior of numerical models require a significant number of measurement points; unfortunately, interior dynamic response due to time-varying loads is not currently predictable from measured data.

The current research focuses on the global and local interior and exterior member dynamic interactions to understand the possible loss of structural integrity and fatigue failure of complex composite structures. Using some newly developed dynamic stress-strain modeling approaches from limited sets of measured locations, identification of stress-strain distributions will be used as a damage detection tool for structural health monitoring assessment.

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