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A Load Identification Method in Structural Desing

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One of the most critical aspects of design for an analyst or designer is understanding the service loads that a system or component will experience. In a standard finite element (FE) analysis, the service load history is applied to the FE model to generate the corresponding history of stresses and strains, which are necessary for further evaluation. However, for components operating in complex environments, accurately measuring or predicting the service load history can be particularly challenging. Instrumenting a prototype with load transducers is often an expensive and time-consuming process and, most importantly, may physically alter the component, changing its mass, stiffness, and load path, causing discrepancies between the measured and actual loads. In this context, this paper presents a load identification method, enhancing the mathematics behind the load identification theory and reducing the uncertainties inherent in the standard approach, primarily due to the placement, number, and orientation of transducers, as well as the mathematical approach itself.

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