Dynamic Analysis of an Engine-Transmission Assembly Superelement and Component Mode Synthesis *

Abstract

Automotive down sizing needs have offered finite element analysis techniques fresh opportunities to make a significant impact on the development/manufacturing of highly efficient modern powerplant designs by becoming an integral part of the design process. Efficient use of material in engine-transmission design calls for a thorough understanding of the dynamic behavior of the system. Due to the complexity of these parts, the finite element representation is usually a large model consisting of several thousand grids and elements. One single step eigen-solution approach is not practical to obtain vibration modes and frequencies. Superelement methods along with Guyan reduction is a possible solution technique. However, it is not a trivial task to select suitable ASET points in such systems to obtain reasonably good results. Component mode synthesis, on the other hand, would give acceptable results provided proper boundary conditions and adequate modes are selected for the components. This presentation examines Guyan reduction and component mode synthesis application to engine-transmission systems. Experimental results are expected to be available in time for the presentation.

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* Oral presentation only