

Eliminating Indefinite Mass Matrices with the Transmission Simulator Method of Substructuring

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ABSTRACT

The transmission simulator method of experimental dynamic substructuring captures the interface forces and motions through a fixture called the transmission simulator, avoiding the need to measure connection point rotations and enriching the modal basis of the substructure model. The free modes of the experimental substructure mounted to the transmission simulator are measured. The finite element model of the transmission simulator is used to couple the experimental substructure to another substructure and to subtract the transmission simulator. However, in several cases the process of subtracting the transmission simulator has introduced an indefinite mass matrix for the experimental substructure. The authors previously developed metrics that could be used to identify which modes of the experimental model led to the indefinite mass matrix. A procedure is developed that utilizes those metrics with a sensitivity analysis to adjust the transmission simulator mass matrix so that the subtraction does not produce an indefinite mass matrix.

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