TWO PARAMETER MODEL FOR JOINT STIFFNESS IDENTIFICATION IN A SINGLE LAP JOINTED STRUCTURAL ASSEMBLIES USING SUB-STRUCTURE SYNTHESIS

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Abstract

Many mechanical structures are composed of substructures connected together by joints such as bolts, welds, rivets etc. The added flexibility introduced by the joint to the structure has significant effect on the static and dynamic behavior of the structure and must be accurately modeled. This fact clearly indicates that the analyses will not properly model the dynamic behavior of the structure if the joints cannot be accurately identified. This has prompted the researchers to include the effect of joint stiffness in the structural model and to estimate the stiffness parameters using inverse dynamics. In the present work, single lap joint has been modeled as a pair of translational and rotational springs and frequency equation of the overall system has been developed using sub-structure synthesis. The validity of the proposed method is demonstrated; only first few natural frequencies of the composite system is required to estimate unknown joint stiffness parameters.