

Abstract for ESTECH Conference 2020

Title: Designing an Impedance Matched Test Fixture Using Parameterized Optimization and the Modal Projection Error

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Structural dynamic environments testing in the laboratory is a necessity for components and subsystems in practice. This is because it is too cost prohibitive to test different designs in the field to ensure the product will not mechanically fail. However, replicating the stresses from a field environment in the laboratory is not trivial. One difficulty is replicating the field configuration impedance of the unit under test in the laboratory. In the laboratory, the test fixture dominates the mechanical impedance of the connection to the unit under test and, therefore, the response. In order to study how to design test fixtures, the boundary condition round robin was introduced and the BARC (Box Assembly with Removable Component) was designed. This presentation examines a new and novel method of designing dynamic test fixtures in a way that actually matches the impedance of the next level of assembly using the BARC hardware. Parameterized optimization is the main tool in conjunction with a new metric in the modal projection error. This presentation compares stresses of an optimized BARC fixture, a traditional rigid fixture, and the reference stresses to quantify the success of the optimized test fixture design.

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