



Challenges and Promises of Experimental Substructures

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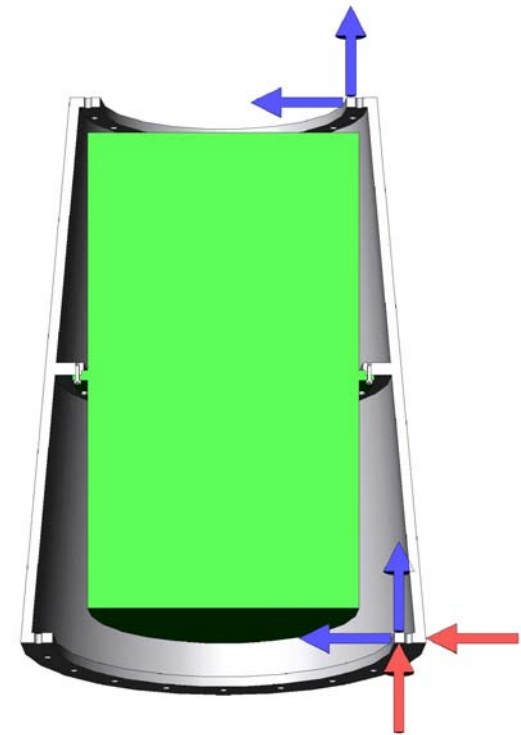
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Motivation for Experimental Substructures

- Need a dynamic model of a full system
- Desire to have FE model of your agency's substructures on which you have design authority or force inputs
- Desire a cheap/good model of other agency's substructures on which you have no design authority

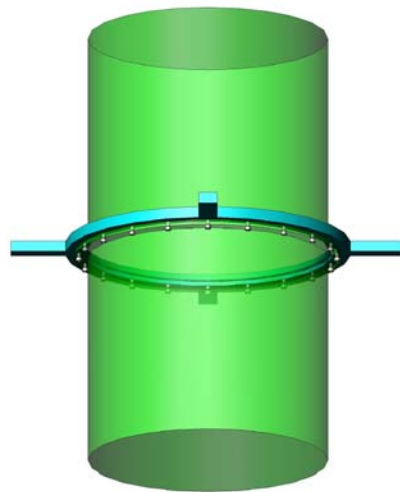




Promise of Transmission Simulator Approach

- Attach instrumented fixture known as the transmission simulator to the experimental substructure as well as attaching analytical model of the transmission simulator to the FE model
- To join the substructures, constrain the transmission simulator motion at the test dof (translations) to be the same
- Subtract the transmission simulator stiffness and mass two times
- Eliminates need to measure rotations/moments and residual flexibilities at every connection point

Experiment



FE





Challenges in Experimental Substructures

- **Subtraction of the transmission simulator in modal substructures often leads to negative eigenvalues in the eigenvalue solution**
- **Metrics are needed to indicate whether a substructure may have this problem**
- **Methods are needed to correct the matrices to eliminate the negative eigenvalues and not degrade the solution**
- **There are similar needs for Frequency Based Substructures**