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Hybrid Analysis

- Experiment based method
- Investigate Dynamic Response of Structures
- One or more "numerical" substructure...
- And one or more experimental substructure



Response of the Hybrid Model

- Solve equations of motion
- Time Stepping Integration Procedure
- Dynamically Incorporating Computed and Measured Data









Ellipsoidal Approximation of Reachable Sets

- Ellipsoidal Techniques for Reachability Analysis (Kurzhanski and Varaiya (2000))
- Ellipsoidal Approx. constructed to be tangent to reachable sets
- Consider the external ellipsoidal approximations (more conservative)
 - Ellipsoidal Toolbox [MATLab] used







Remaining Steps

- Complete 2DOF Model for Earthquake excitation
- Examine actual test results and compare to methods developed so far (may continue after semester)



References

- Chopra AK. Dynamics of Structures. Prentice Hall, 2001.
- Scacchioli A, Bayen AM, Stojadinovic B. Dynamics of Structures using Reachability Analysis. 2007.
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- Kurzhanski AB, Varaiya P. On ellipsoidal techniques for reachability analysis. 2000.
- Mitchell IM, Bayen AM, Tomlin CJ. A Time-Dependent Hamilton-Jacobi Formulation of Reachable Sets for Continuous Dynamic Games. IEEE Transaction on Automatic Control. 2005.