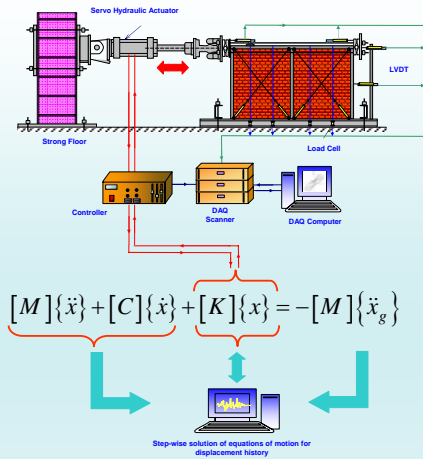


Pseudo Dynamic Test Facility for Simulation of Earthquake Loads



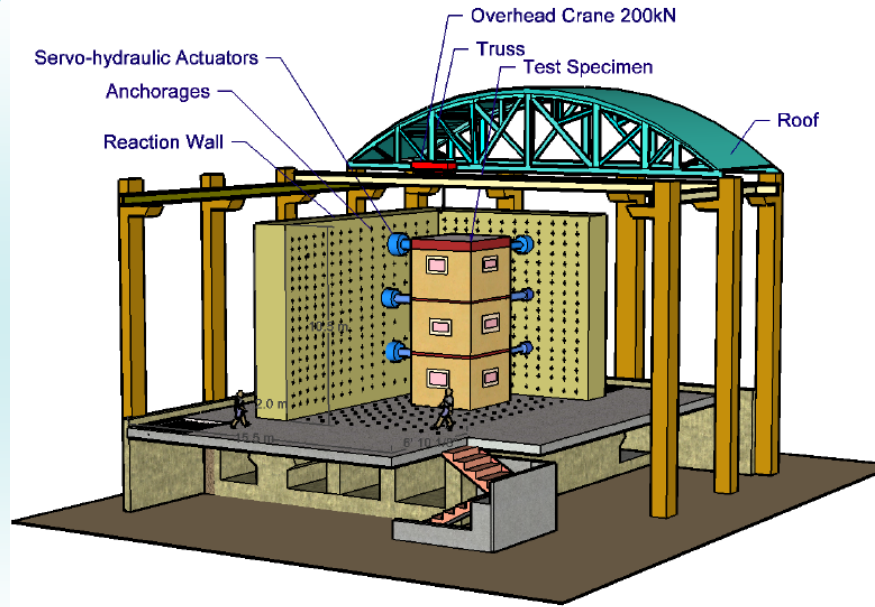
Department of Civil Engineering
Indian Institute of Technology Kanpur

Pseudo Dynamic (PsD) Test



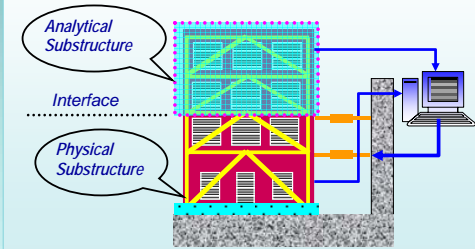
- Equations of motions are solved on-line for displacements to be applied in real time while updating the system parameters from on-line measurements of forces and displacements.
- Effect of inertia force is accounted for in approximate sense and strain rate effects are not considered as test is carried out at slow rate.

Pseudo Dynamic (PsD) Test Facility



Realistic earthquake type loading for prototypical structural systems

Hybrid PsD using Substructures



$$[M]\{\ddot{u}\} + [C]\{\dot{u}\} + [K]\{u\} = -[M]\{\ddot{u}_g\}$$

$$\begin{bmatrix} M_{ee} & M_{en} \\ M_{en}^T & M_{nn} \end{bmatrix} \begin{Bmatrix} \ddot{d}_e \\ \ddot{d}_n \end{Bmatrix} + \begin{bmatrix} C_{ee} & C_{en} \\ C_{en}^T & C_{nn} \end{bmatrix} \begin{Bmatrix} \dot{d}_e \\ \dot{d}_n \end{Bmatrix} + \begin{Bmatrix} R_e \\ R_n \end{Bmatrix} = \begin{Bmatrix} f_e \\ f_n \end{Bmatrix}$$

- Synthesis of numerical modeling and experimental testing.
- Require adequate simulation of boundary conditions at the interface

Components of PsD Facility

PsD Apparatus

- Non-yielding and stiff integrated reaction floor-wall assembly
- 10x15x4.0m three cell box girder floor and 10m high, 2m thick post-tensioned wall
- Anchorages at 0.5m grid capable of 2MN for axial load and 1.5MN for shear loads

Servo-Hydraulic Actuators

- Closed-loop servo-controlled hydraulic actuators to apply loads in the displacement controlled mode
- Large capacities upto 2MN



Control

- 6-Station, 16-bit PID Servo controller and interlocking
- Frequency range: 0.01-1000 Hz
- 6-channel simultaneous data acquisition and remote drive file play out.



Data Acquisition & Sensors

- Wired and non-contact sensors
- Fast and Synchronous data acquisition
- Telepresence and web-streaming
- Video images correlated with sensor data

