CHOPRA THE EXPERIMENTALIST

Jack Moehle
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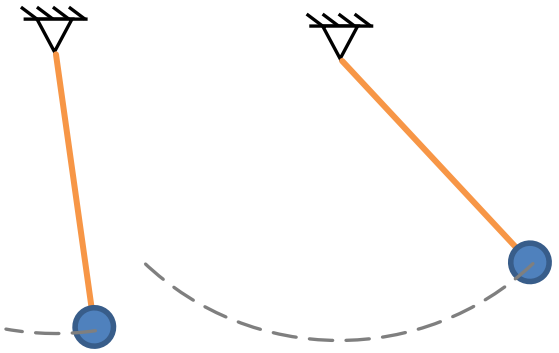
The pendulum

$$T = 2\pi\sqrt{\frac{L}{g}}$$



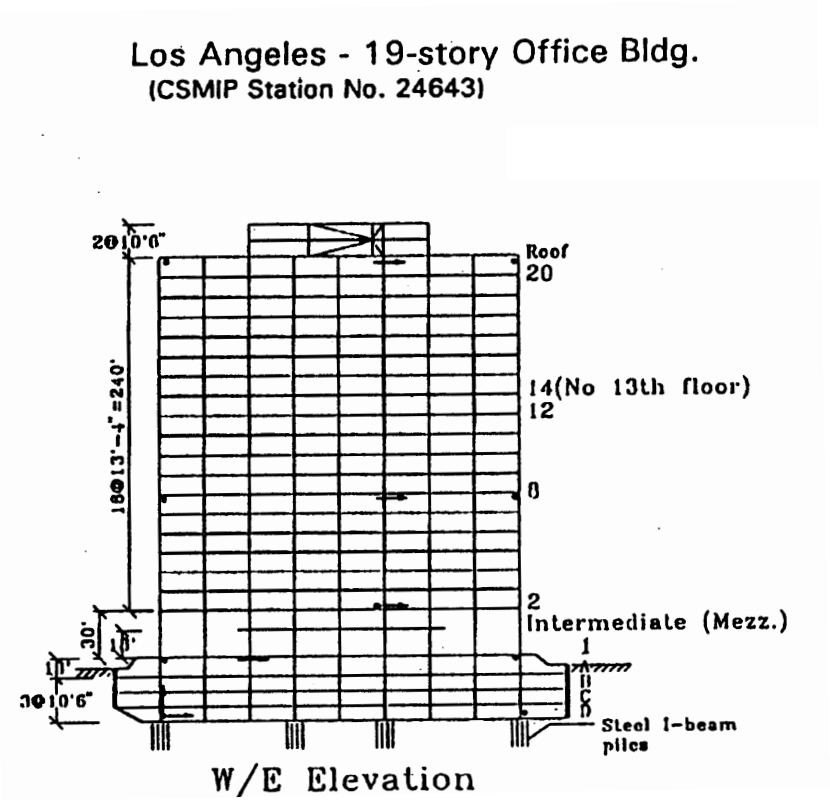
The building

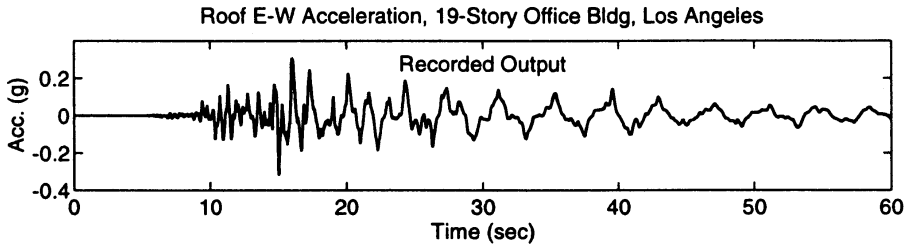
Anil Chopra

$$T = \alpha H^{\beta}$$

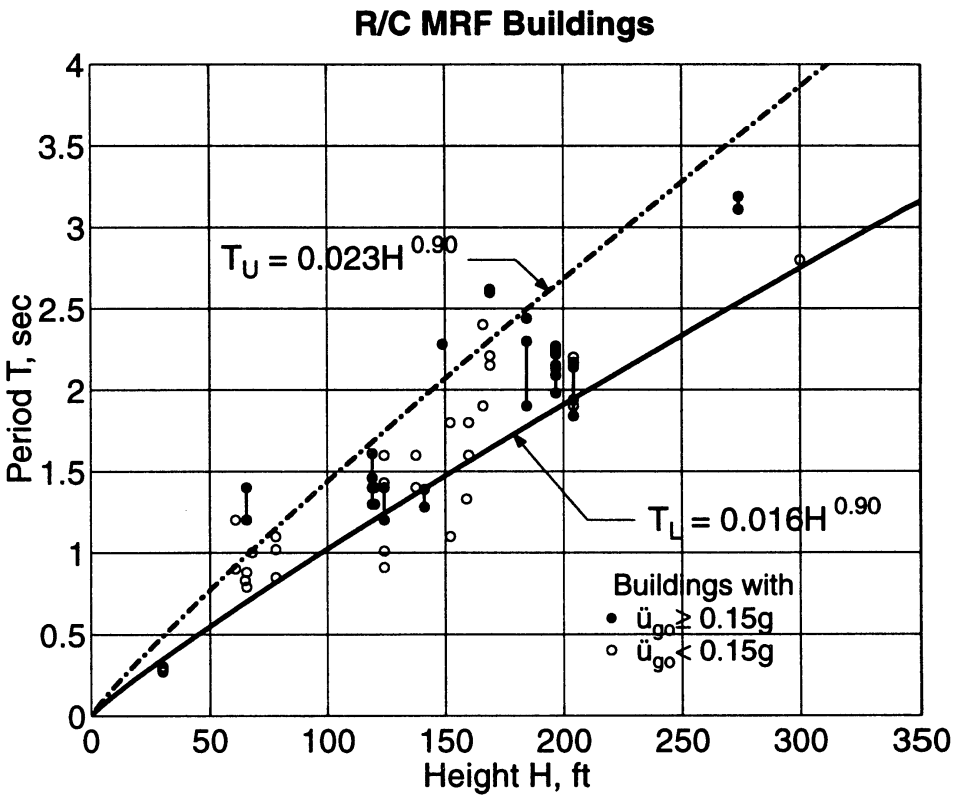
hedcut by Moehle

Measured building response

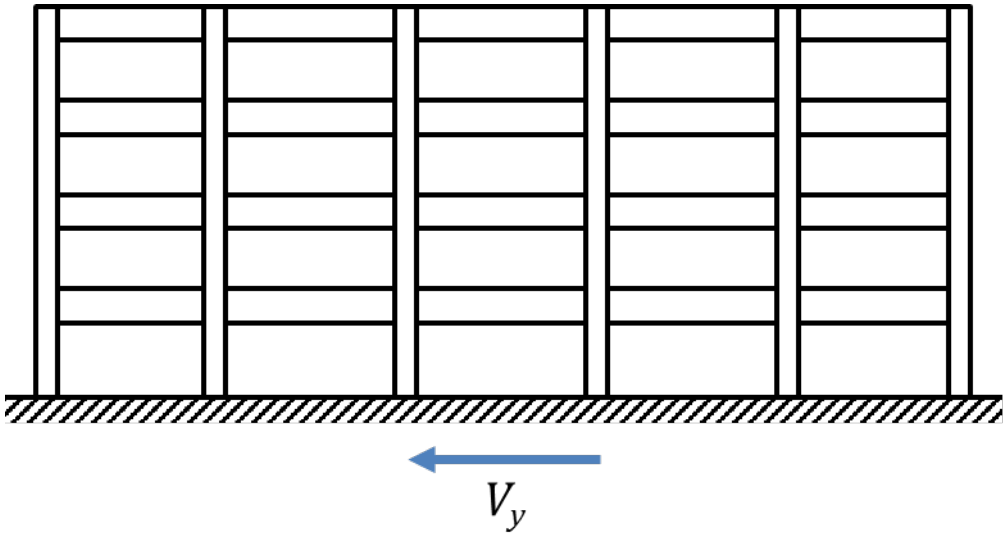




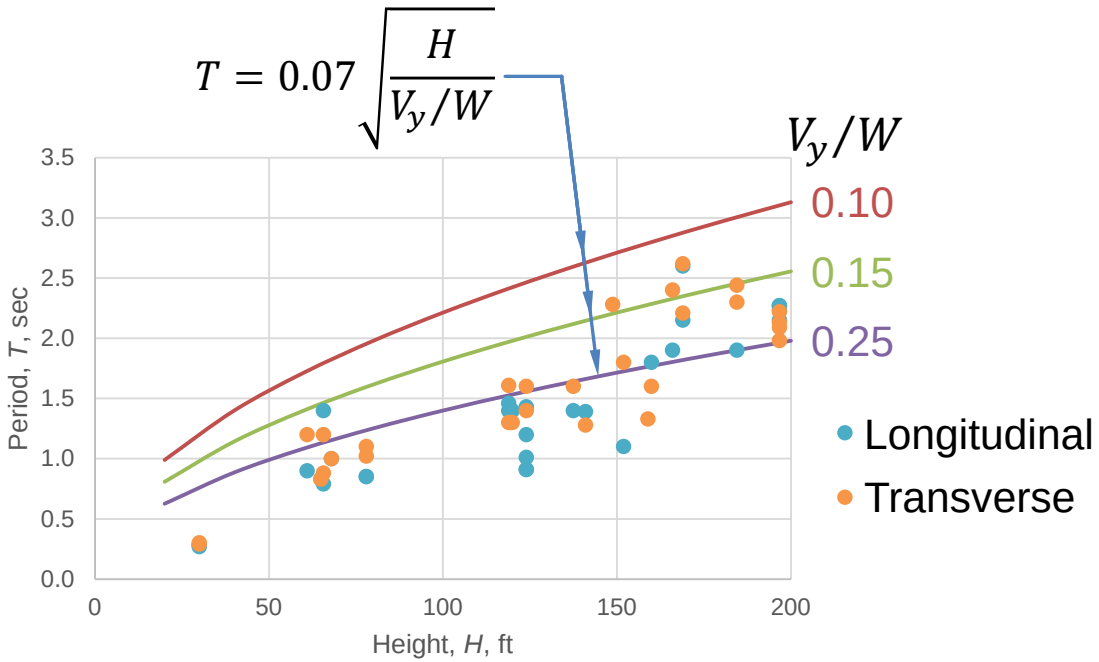
Concrete frame formulas



Existing RC frame buildings (ATC 78)



Existing RC frame buildings

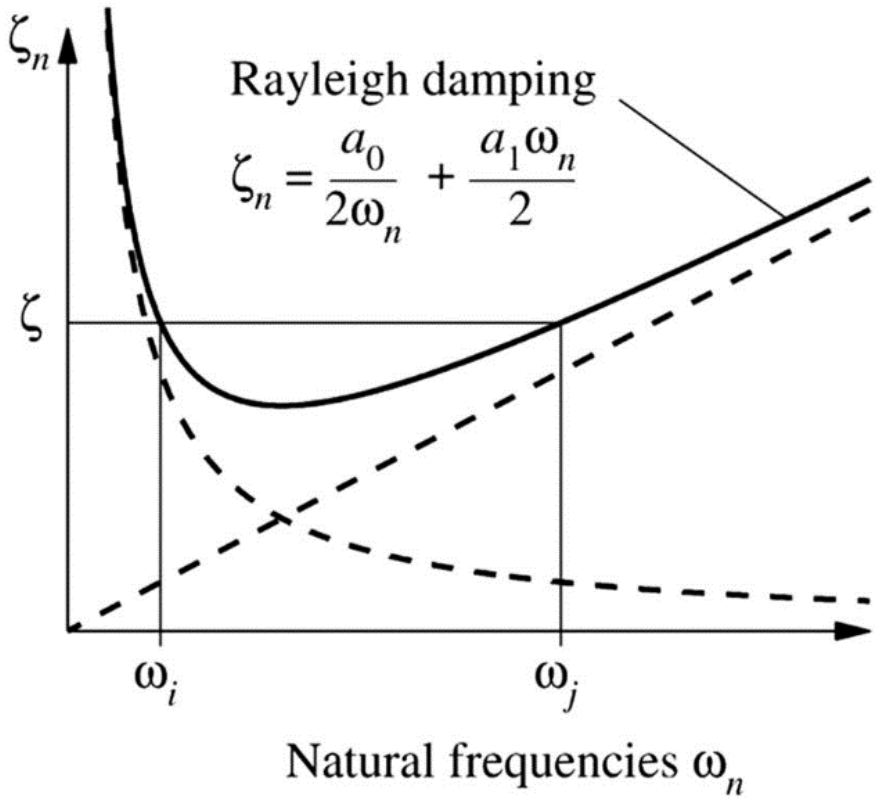


Performance-based seismic design of buildings

Anil Chopra

- Ground motions
- Damping models
- Peer review

Rayleigh damping



Chopra and McKenna, 2016

Damping forces

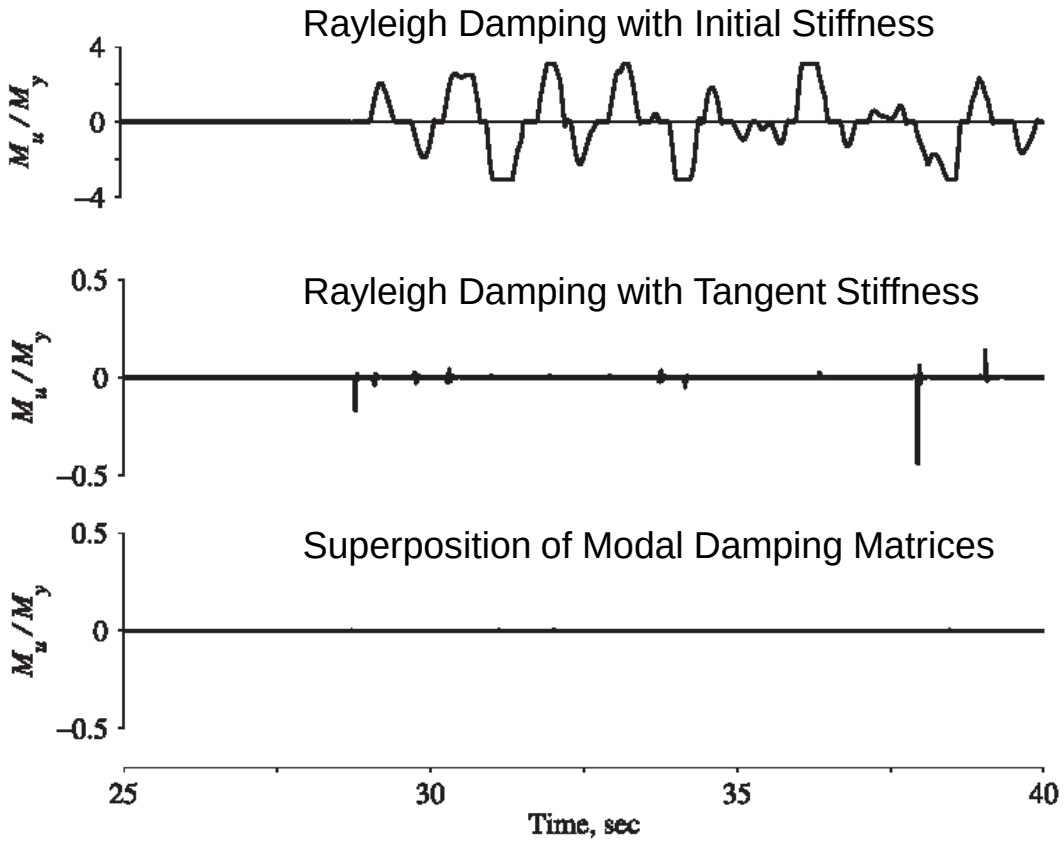
Rayleigh damping

$$\begin{Bmatrix} f_{Dt} \\ f_{D0} \end{Bmatrix} = \begin{bmatrix} c_{tt} & c_{t0} \\ c_{0t} & c_{00} \end{bmatrix} \begin{Bmatrix} ui_t \\ ui_0 \end{Bmatrix}$$

Superposition of modal damping

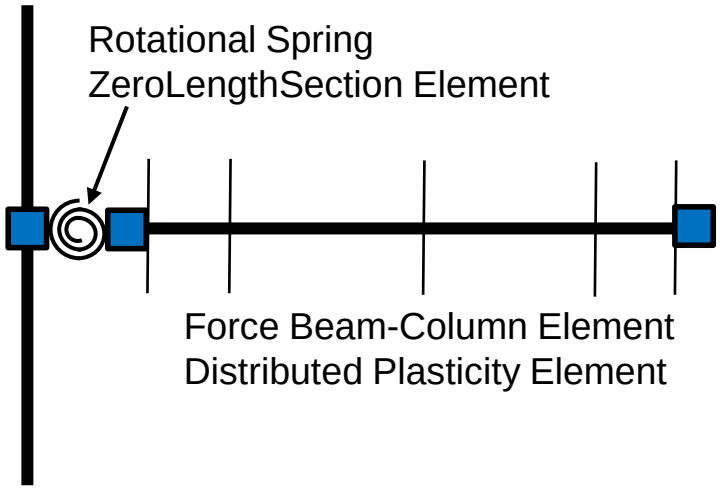
$$\begin{Bmatrix} f_{Dt} \\ f_{D0} \end{Bmatrix} = \begin{bmatrix} c_{tt} & 0 \\ 0 & 0 \end{bmatrix} \begin{Bmatrix} ui_t \\ ui_0 \end{Bmatrix}$$

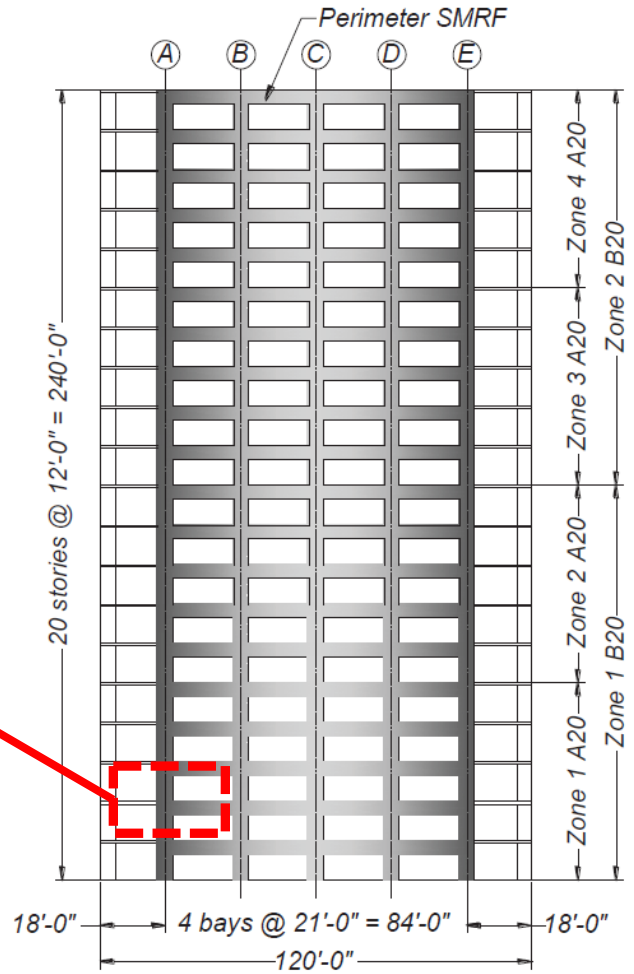
Spurious damping forces



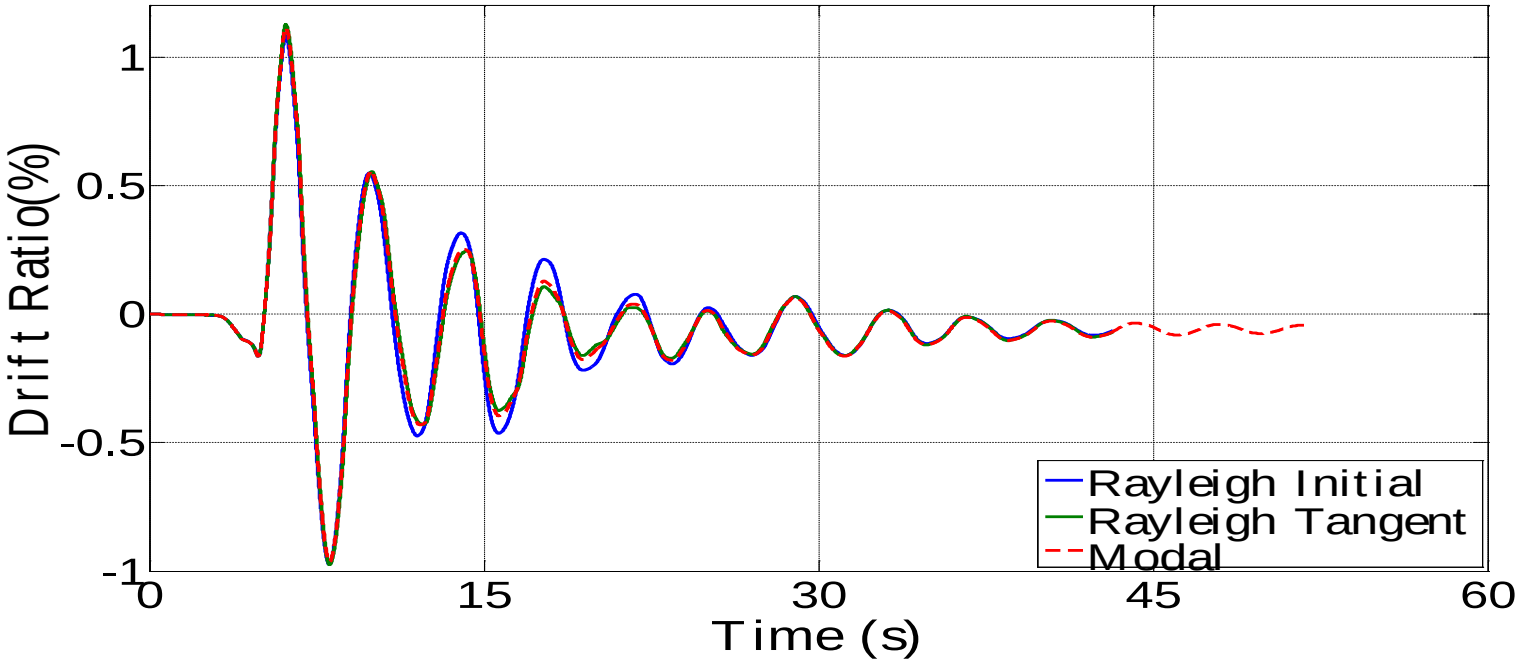
Chopra and McKenna, 2016

Concrete frames with high-strength reinforcement

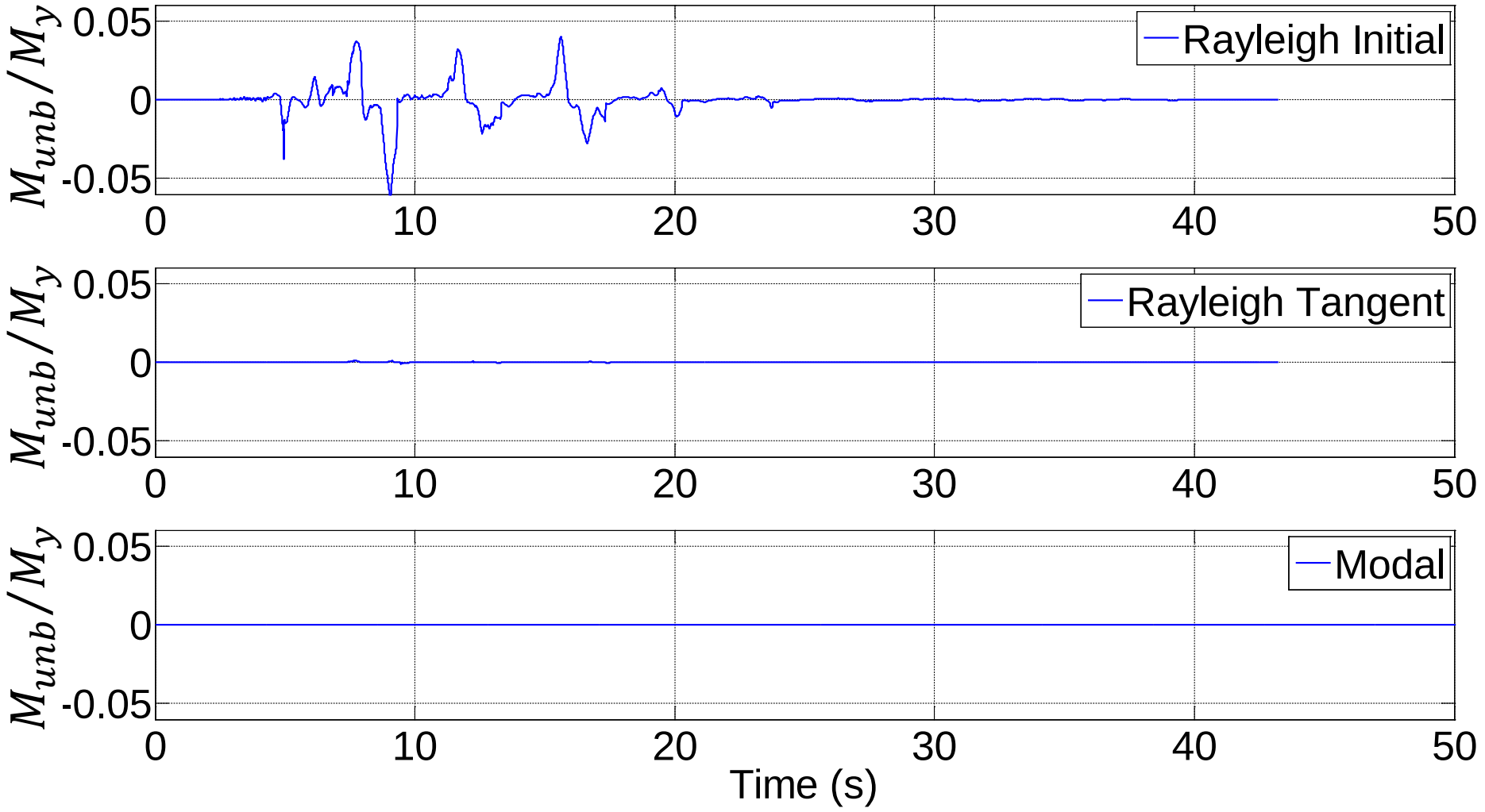




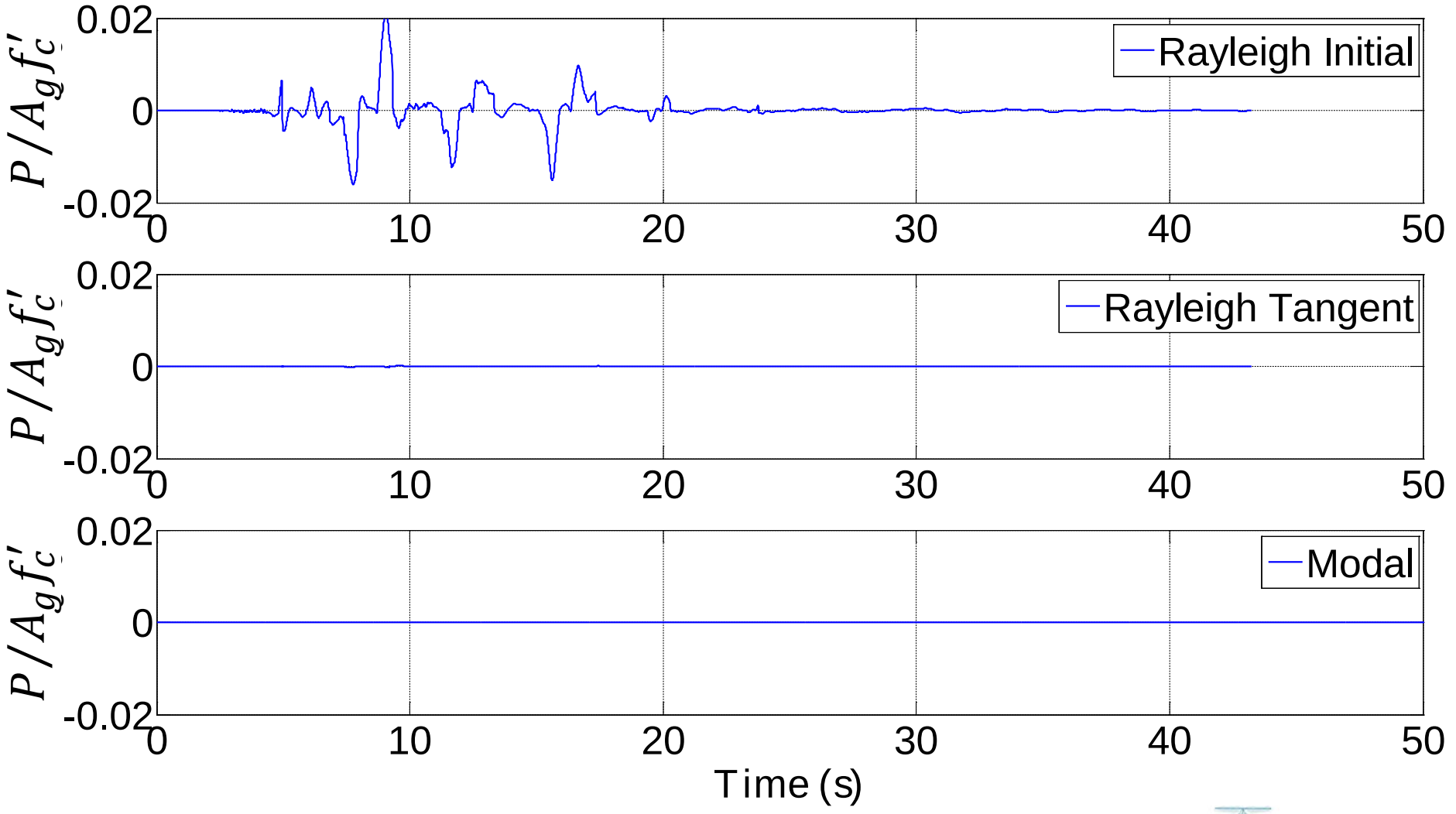
Effect of damping model on roof drift



Spurious moments

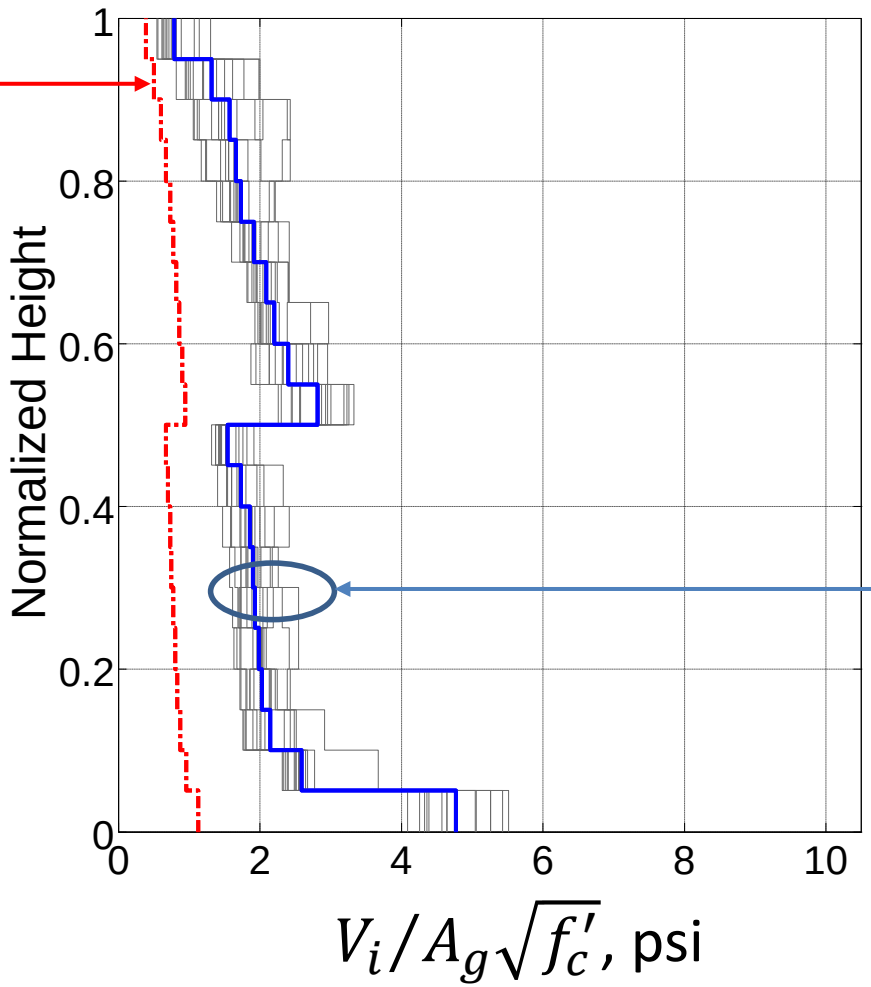


Spurious axial forces



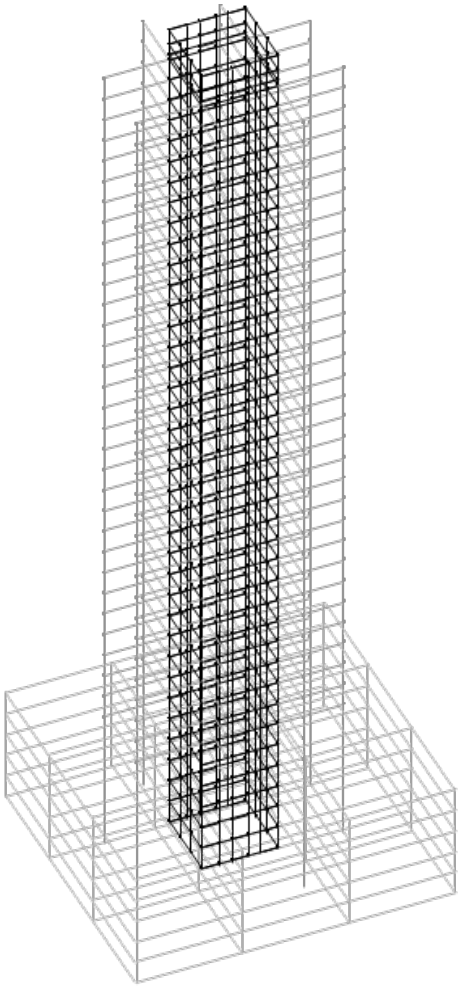
Column shears

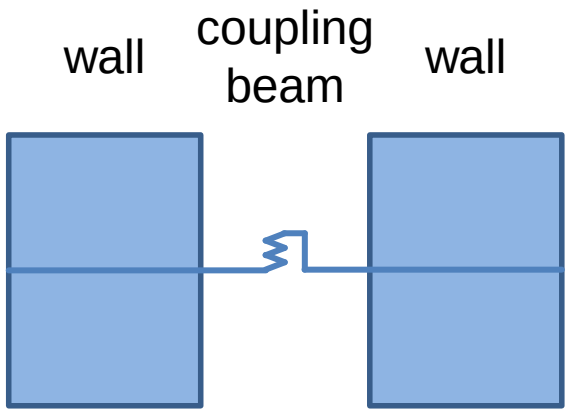
Modal response spectrum analysis reduced by *R*



Nonlinear dynamic analysis

Typical tall building model





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