NANYANG TECHNOLOGICAL UNIVERSITY

Institute of Catastrophe Risk Management

Dr Ning Chaolie
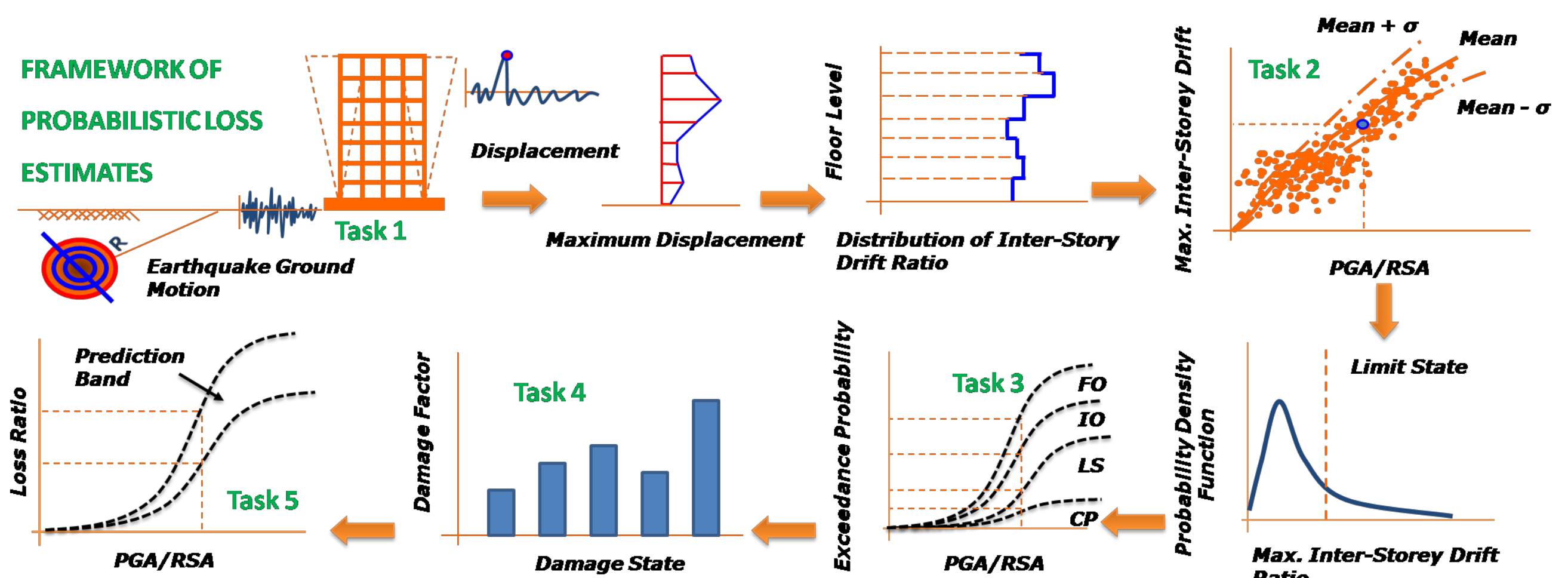A/P Li Bing
Prof Pan Tso-Chien

Probabilistic Loss Estimates of Non-Ductile Reinforced Concrete Structures

We develop a comprehensive framework to conduct probabilistic damage assessment of non-ductile reinforced concrete structures to seismic events by using an efficient and simplified beam-column joint model. A set of fragility curves is developed and mapped onto the framework for probabilistic loss estimates of low-rise, middle-rise, high-rise and super high-rise buildings in Singapore at different confidence level.
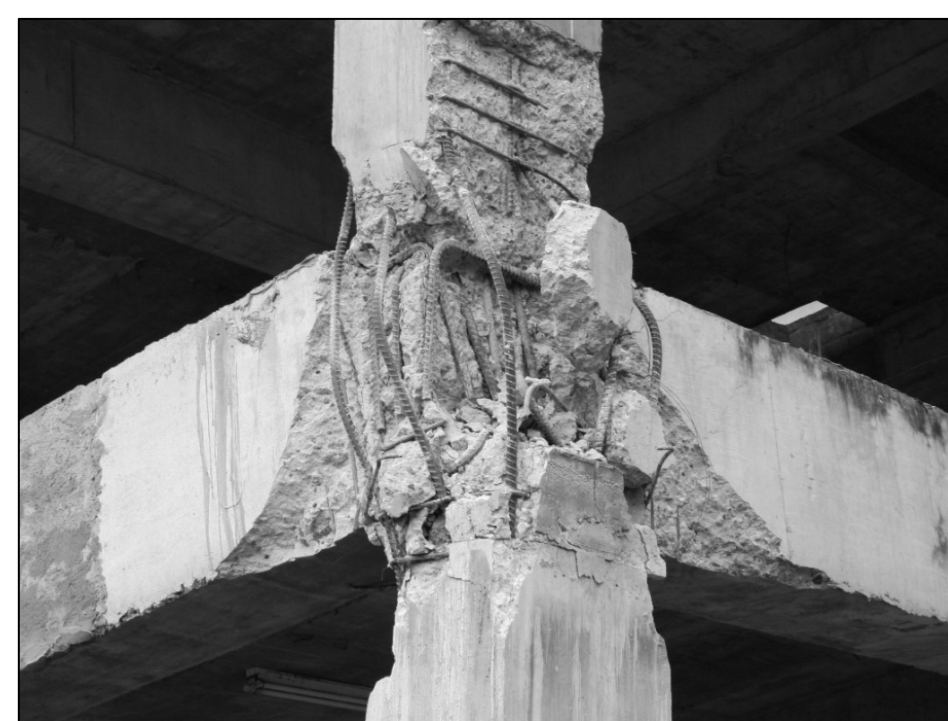
Steps of Probabilistic Loss Estimates:

- **Task 1:** Selection of ground motion and representative building
- **Task 2:** Incremental dynamic analysis
- **Task 3:** Generation of fragility curves
- **Task 4:** Determination of damage factor
- **Task 5:** Generation of loss ratio

Framework of Probabilistic Loss Estimates

Results of Probabilistic Loss Estimates:

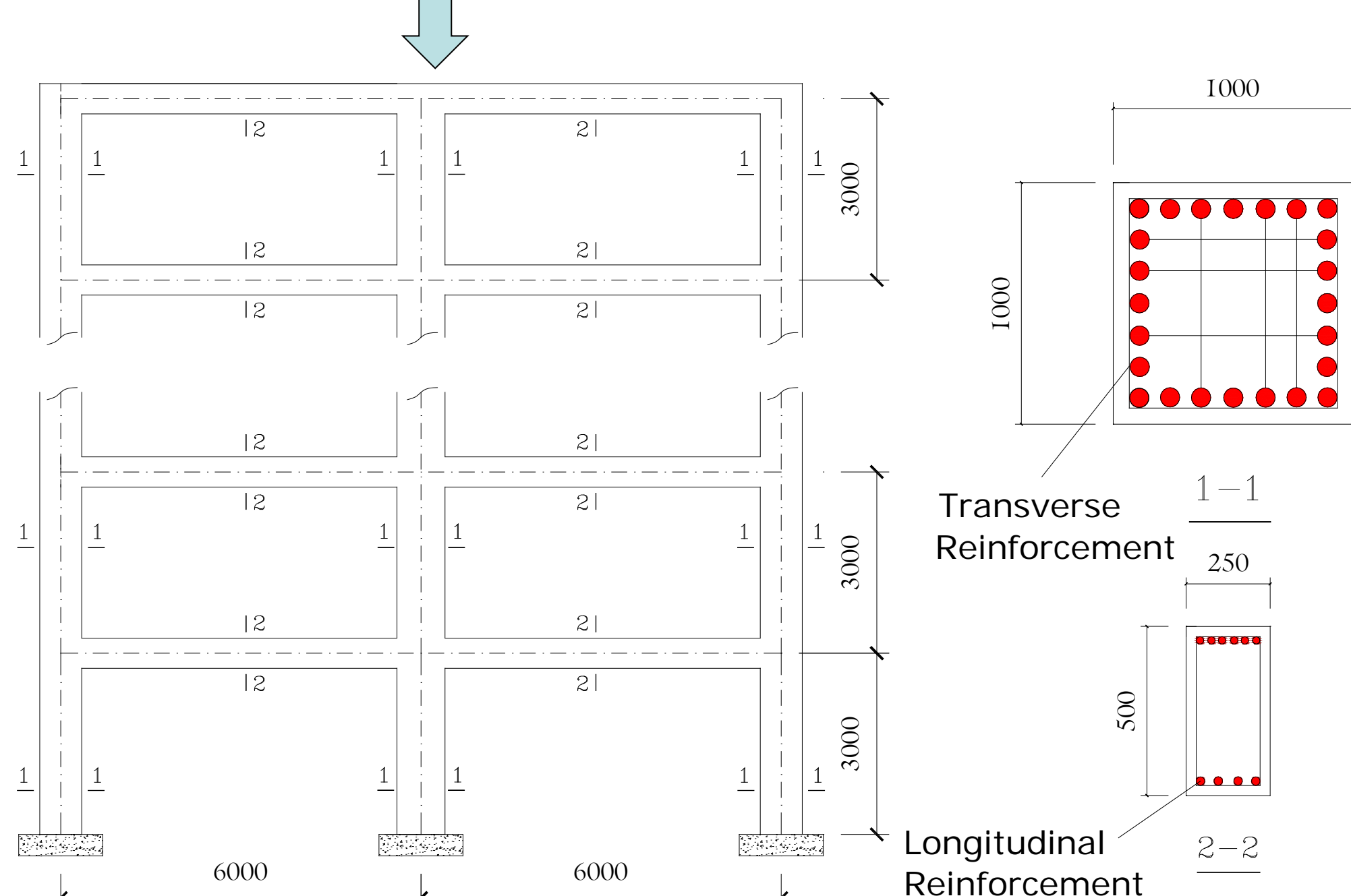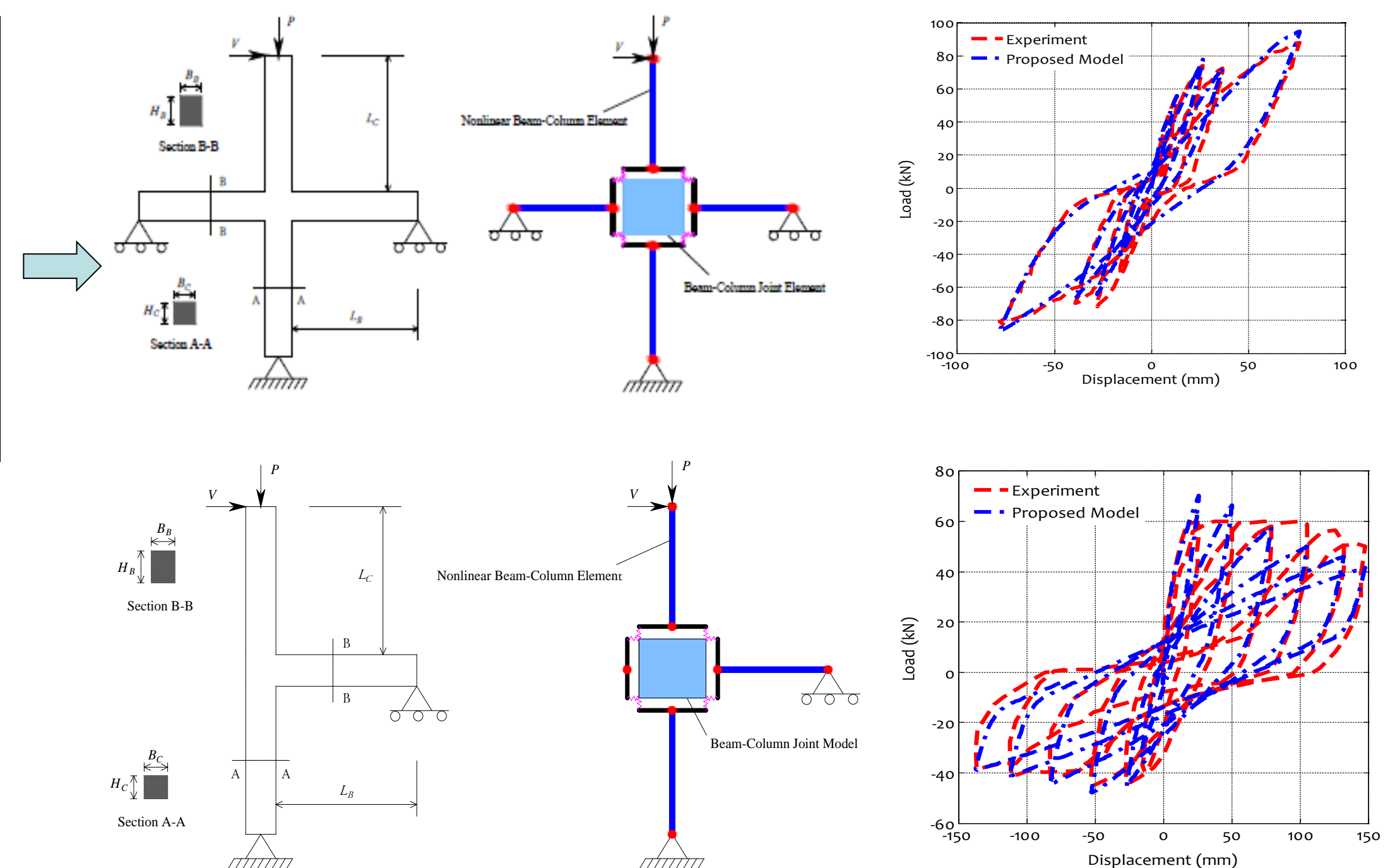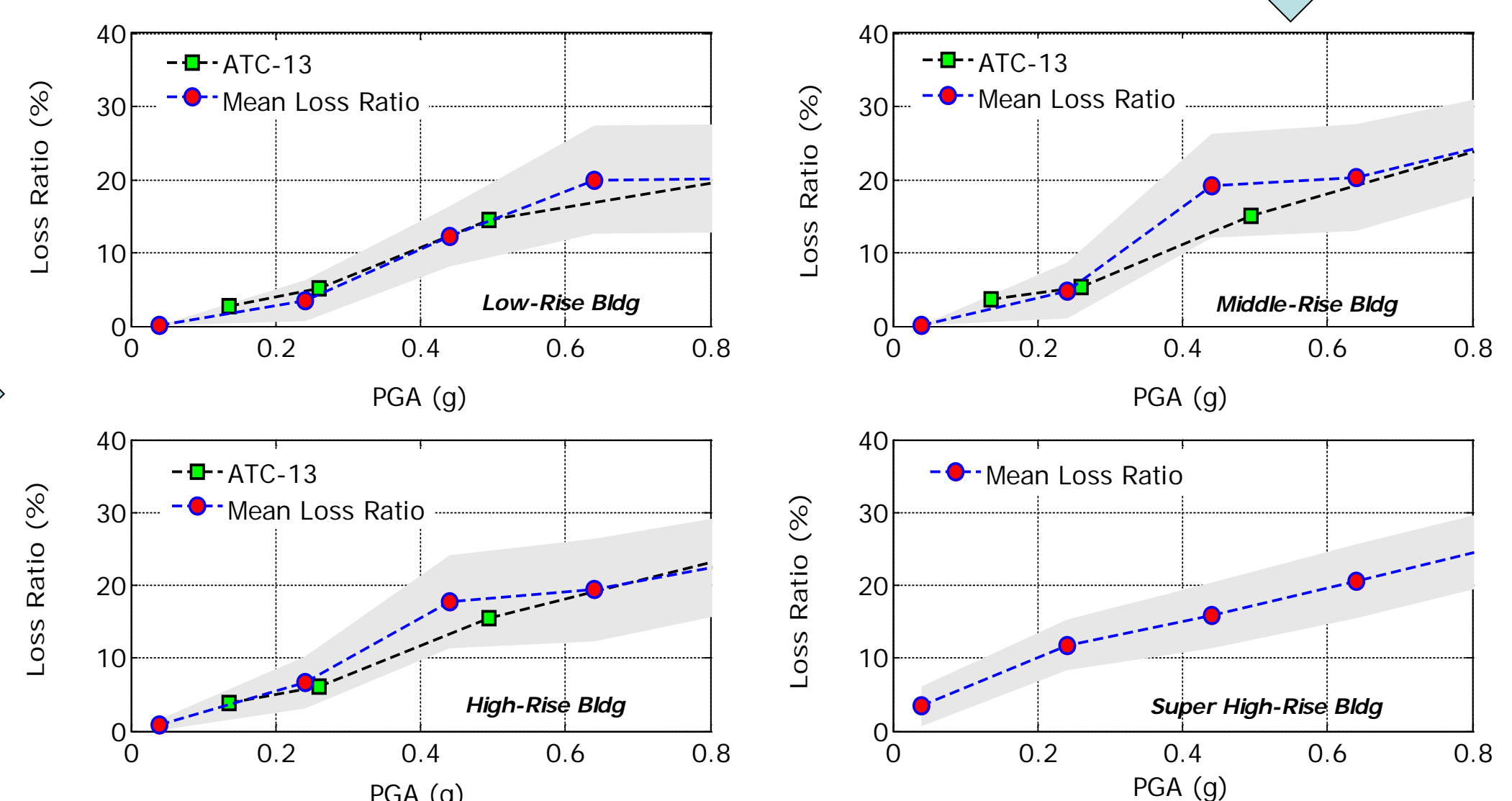Severe damage to non-seismic detailed beam-column joints (Padang Earthquake, 2009)

Illustration of Non-Ductile Reinforced Concrete Structures

Non-Ductile Beam-Column Joint Model

Probabilistic Loss Estimates of Non-Ductile Reinforced Concrete Structures

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