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HIGHER-MODE EFFECTS IN SINGLE AND MULTI-PART ROCKING BRACING SYSTEMS BEHAVIOR

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Nowadays, the subject of resilience in structures is concerned by many researchers. One of the ideas about this subject is the use of single part rocking systems. Although single rocking systems have acceptable seismic behavior, they are limited in height. In this system by increasing height, force demands are amplified by higher-mode effects. Previous researches have proposed the use of multi-part rocking systems with energy dissipation for reducing higher-mode effects.

In this paper, higher-mode effects in single and multi-part rocking bracing systems behavior are studied. For this purpose, a series of nonlinear time history analysis is performed on the single part, two-part, and three-part rocking system. The structure has 10 stories.

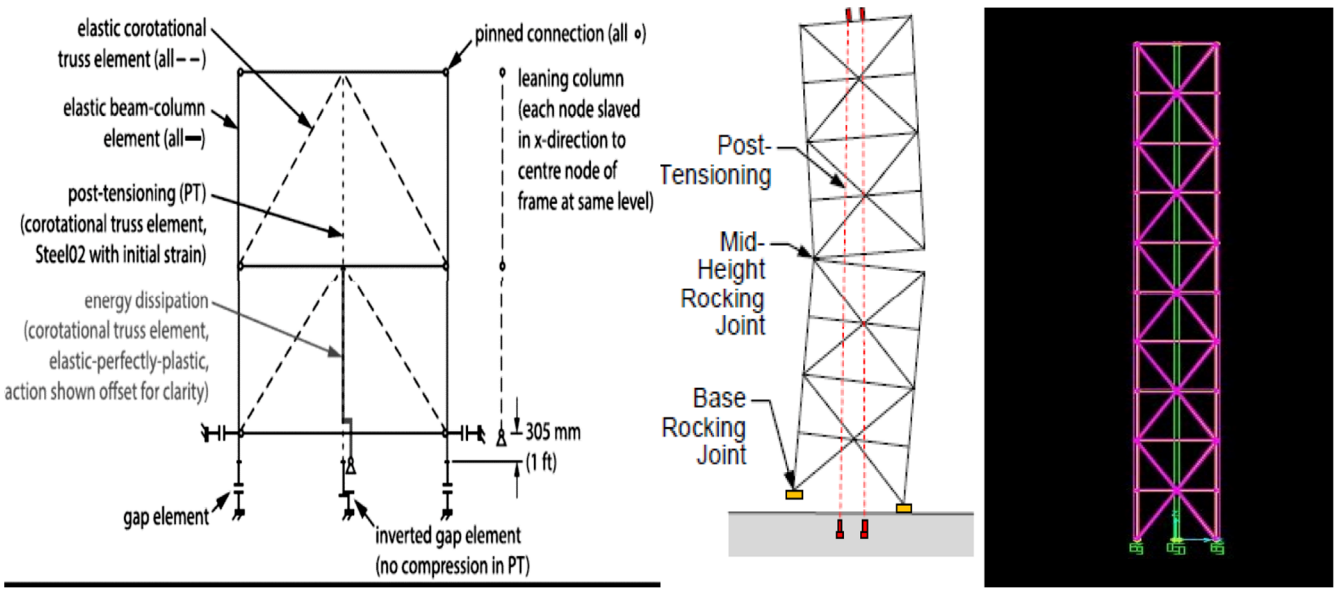

Figure 1. In order from left to right: Method of modeling (Wiebe & Christopoulos, 2014) - A sample of the two-part rocking bracing system (Eatherton & Etal, 2012) - Modeling of the system in 10 stories.

Results show that the multi-part rocking bracing system not only reduces overturning moment and shear force significantly, but also increases the energy dissipation. Although the multi-part rocking bracing systems increases drift values compared to the single part rocking system, all of the seismic drifts are in the elastic range. Besides, according to the results, it can be realized that the two-part rocking system is sufficient for mid-rise buildings and using the three-part rocking system is not recommended.

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