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***Investigation of Performance Levels in R.C. Tall building with Moment Resistance frames Retrofitted with steel bracing in the MCE Hazard Level.***

S. Alerasoul; A. Keramati

**ABSTRACT (Nouadoy)**

Nowadays one of the primary demands in the design of structures is to provide life safety performance level with minimal of human and financial damage after severe earthquakes. The Iranian seismic standard (2800) has introduces possesses stipulates two hazard levels; the service level and design level. The latter is defined as an earthquake with 10% probability of occurrence in 50 years. Also the “FEMA-356”: define the MCE level as maximum hazard level that refers to an earthquake with 2% probability of occurrence in 50 years.

This paper presents research on R.C. tall buildings designed based on the 2800 standard and retrofitted with steel bracing. The selected hazard level in this research is MCE level. The results indicated that unretrofitted buildings collapse at the selected hazard level. Additionally retrofitting of the buildings failed to provide life safety performance level.

**KEYWORDS**

Performance Levels, Hazard level, Retrofitting, Steel bracing, Tall building.

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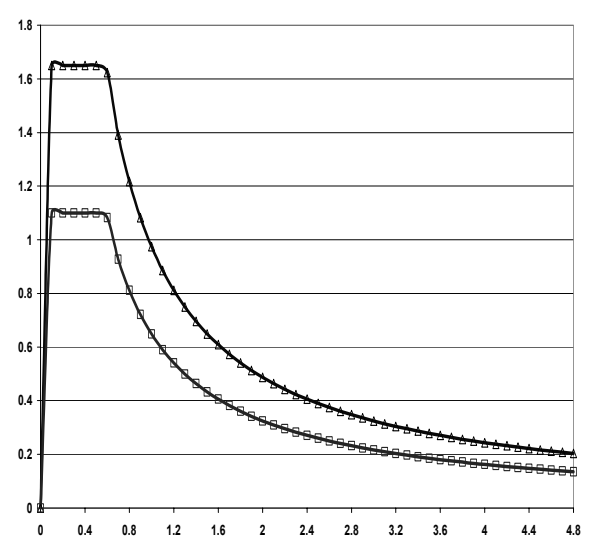
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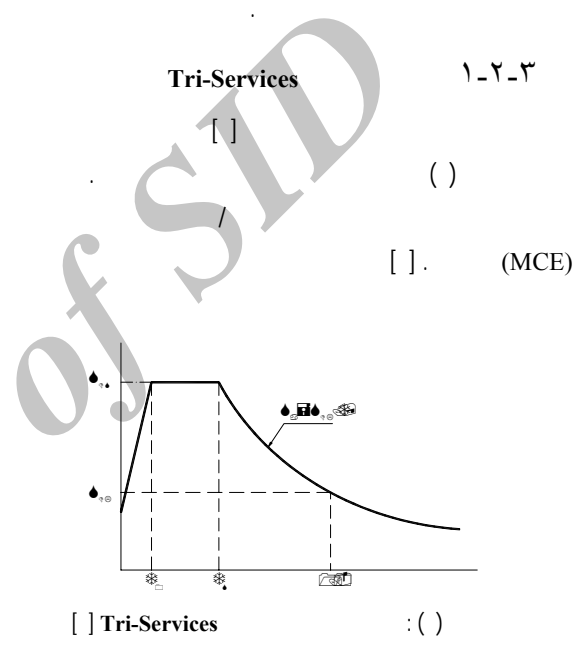


$$S_a = \frac{S_{DL}}{T} \quad (1)$$

$S_{DS}$   $S_{DL}$  (MCE) %  
 $F_v$   $F_a$  . [ ]  
 %  $S_s$   $S_L$  / /  
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$$S_a = 0.4S_{DS} + 0.6S_{DS} \left( \frac{T}{T_o} \right) \quad (2)$$

( ) ( ), ( )  $S_{DL}$   $S_{DS}$   $T_o$

$$T_o = 0.2 \frac{S_{DL}}{S_{DS}} \quad (3)$$

$$S_{DS} = F_a S_s \quad (4)$$

$$F_{DL} = F_v S_L \quad (5)$$

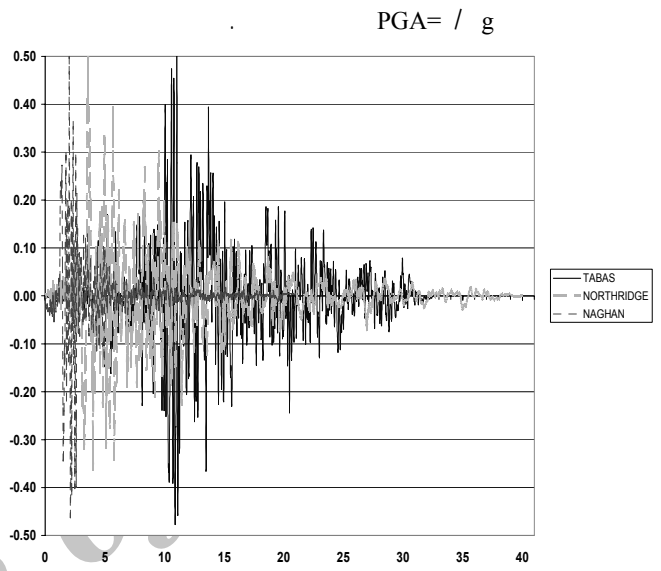
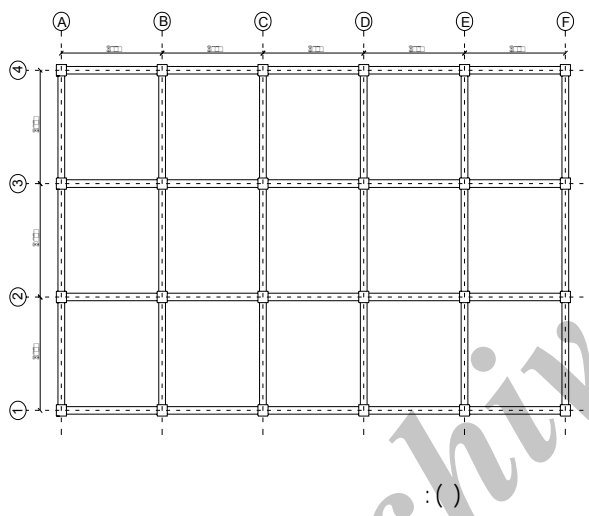
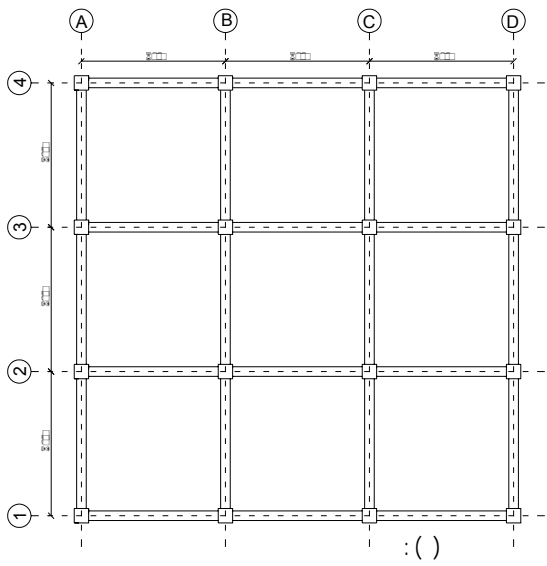
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$$S_a = S_{DS} \quad (6)$$

$$T_s = \frac{S_{DL}}{S_{DS}} \quad (7)$$

:  $T > T_s$  (

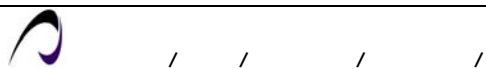
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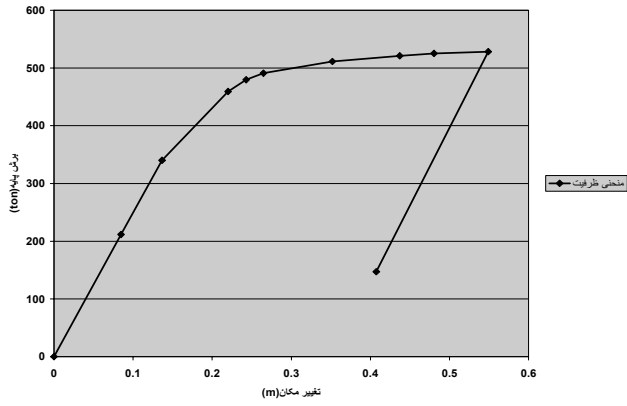
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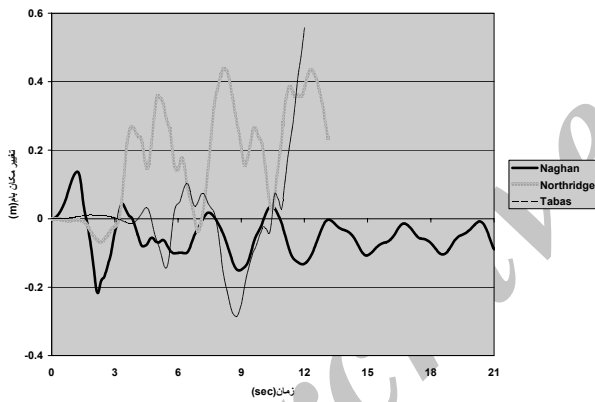
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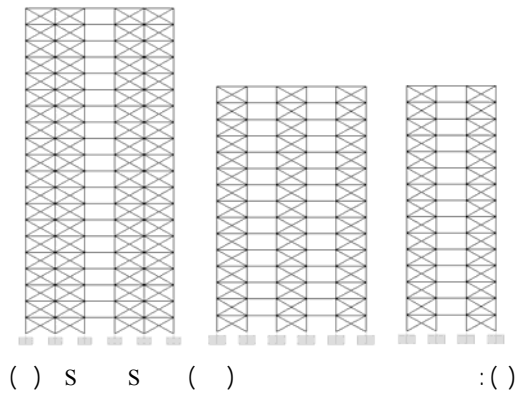
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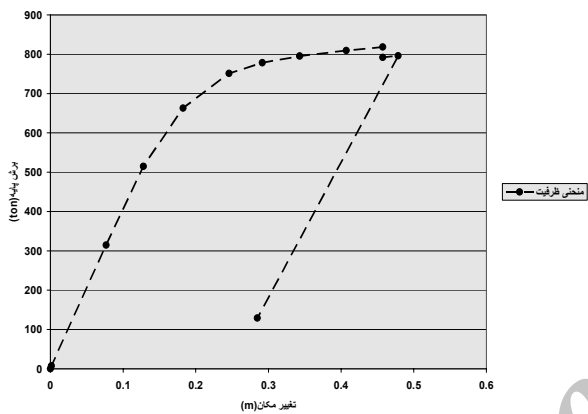
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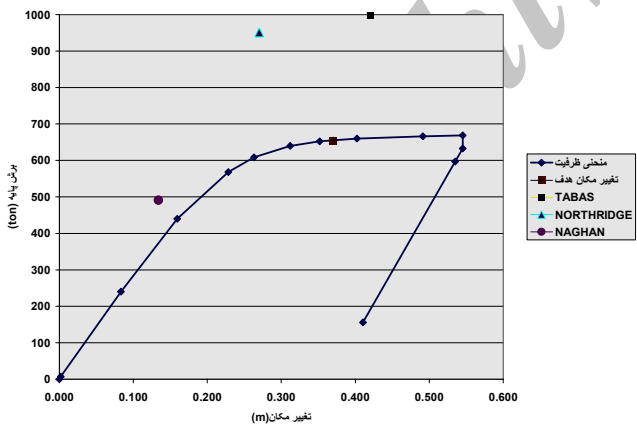
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Step	Dis.	Base Force	A-B	B-IO	IO-LS	LS-CP	CP-C	C-D	D-E	>E	TOTAL
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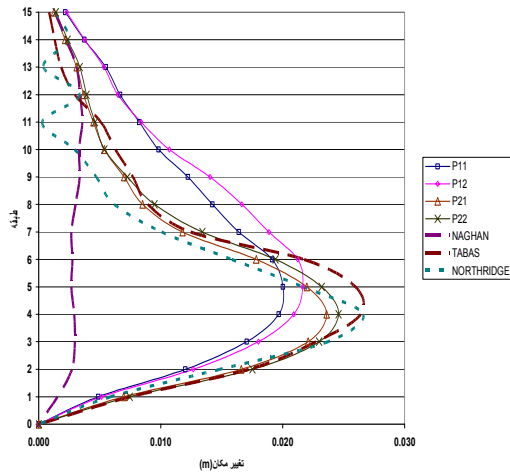
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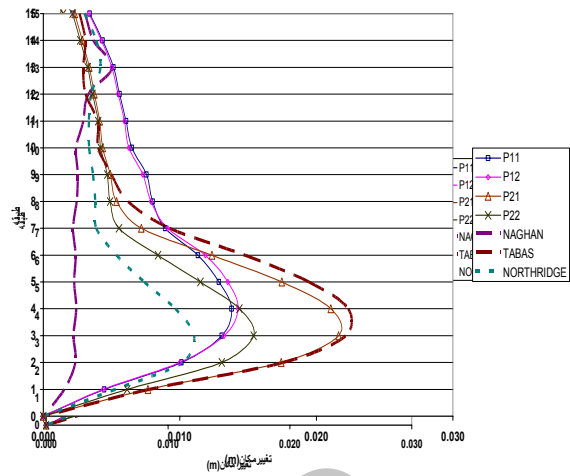
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Hamburger, R.O., "A Framework for Performance-Based Earthquake Resistant design", NISEE: National Information Service for Earthquake Engineering, 1997. [ ]

Tri-Services (TI809-04): Seismic Design for Building Prepared U.S. Army Corps of Engineers, 1996. [ ]

FEMA-356, "Prestandard and Commentary for the Seismic Rehabilitation of Buildings", Prepared by the American Society of Civil. [ ]

J. Maheri, M.R. and Akbari, A., "Seismic behavior factor, R, for Steel X- braced and Knee braced RC buildings", Engineering Structures, 2002, Vol. 25, pp. 1505- 1513. [ ]

ATC 40, 1996, Applied Technology Council, Red Wood City, California. [ ]

\MCE: Maximum Credible earthquake



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