

# **Comparison of Criteria ATC-40 , FEMA-356 to Evaluate the Seismic Safety of Concrete Structures with Moment Frame in Iranian Concrete Code**

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## *Summery*

Today, the role of codes is very important to analysis and structures design , since we can provide suitable performance for structures affecting earthquake using it's existing criteria . In this case, broadly it has been performed researches, indicate that current study can play important role for evaluating the seismic safety of reinforced concrete structures with moment frame system .

In this reason, in first chapter, we discuss to recognizing the performance and behavior of seismic in buildings elements by reviewing characteristics of reinforced concrete buildings and studying the damages caused past earthquakes in order to revising the methods of seismic design in existing codes. In second chapter, we will review to creating new method in earthquake engineering as performance-based design method, by reviewing collection philosophy and evolving codes and analyzing it's design methods limitations ,and we will describe concepts of performance levels ,various levels of seismic hazard and current rehabilitation objectives in guidelines of ATC-40 , FEMA-356 . In third chapter, we describe the displacement coefficient method in guideline of FEMA-356 by reviewing non-linear static analysis methods (pushover) and the related concerns such as determining target displacement, behavioral curves, lateral load distribution patterns and capacity curve formation , and we introduce the current acceptance criteria for non-linear methods in order to controlling structure safety by stating advantages and disadvantage of non-linear static analysis to dynamic analysis method . In 4<sup>th</sup>

chapter , we have also reviewed other performance design method as capacity spectrum method in guideline of ATC-40 that they have been pointed ,and we discuss about evaluating criteria comparison of this method to displacement coefficient method by describing it's current basic steps for finding structure performance point . In 5<sup>th</sup> chapter , we analyze and design them by standard 2800 and Iranian concrete design code (ABA) by introducing three model 3,6 and 9 story as moment frame type ,then we discuss to reviewing values caused non-linear dynamic and static analysis by applying the current criteria in guidelines of ATC-40 , FEMA-356 over them . It can be pointed that has been used from ETABS 2000 software for doing non-linear static analysis and modeling , and from DRAIN-2DX software for doing non-linear dynamic analysis under four earthquake records of Tabas , Naghan , Manjil and Elcentro . In 6<sup>th</sup> chapter , we find the values caused non-linear dynamic and static analysis for four damage control criteria with maximum plastic hinges rotation in beams and columns , maximum inter-story drift and maximum lateral displacement in order to evaluating models seismic safety level and determining it's forced damages amount and with comparing to current acceptance criteria in introduced guidelines , we can review the life safety performance level ensuring of standard 2800 and also seismic safety correct amount in designed models with Iranian concrete code (ABA) and by answering to this question that how is vulnerable the designed models and they need to reinforcement and rehabilitation , we can determine it's seismic safety level rate . Finally with providing one general result , we will present some proposition in this field .