DOI	https://doi.org/10.1061/(ASCE)ST.1943-541X.0003471
Title	Evaluation of Conditional Mean Spectra Code Criteria for Ground Motion Selection
	Background
Why this paper? How'd you find it?	Continuing from the paper I presented on 07/14/23, this paper was part of a literature review aimed at determining the most suitable approach to ground motion selection for PBEE applications.
Study Objective	The paper is more focused on obtaining a target spectrum for design purposes rather than PBEE applications, but it was still relevant for my purposes because it helps build intuition on the effect of the chosen conditioning period, T*, on the EDPs. The paper shows how the EDPs change when T* changes, and also examines the effectiveness of two simplified target spectrum generation approaches aimed at considering a broad range of T* while reducing the computation demand.
Intended gaps to fill	Prior research dealing with this topic exists. This paper extends the discussion by considering a taller archetype and demonstrating the efficacy of the simplified approaches in a unified way.
Authors	Tamika J. Bassman, Kuanshi Zhong, Jack W. Baker
Affiliations	Dept. of Civiland Environmental Engineering, Stanford University
Funding Source	Not mentioned
Journal / Field	Journal of Structural Engineering
Date	August 29, 2022
Historical Context	2006: Introduction of the Conditional Mean Spectrum (CMS) as a target for ground motion selection. ASCE 7-10: First ASCE 7 edition to permit the use of the CMS instead of a UHS for the reduction of conservatism, including recommnedations to reduce computational burden. 2014: Carlton and Abrahamson publish "Issues and approaches for Implementing Conditional Mean Spectra in Practice," demonstrating another simplified approach for reducing computational burden.
Relationship to SEMM	Dynamic Analysis, Earthquake Engineering
	Methods
Given:	Given four available ground motion suite selection approaches: (1) UHS (2) Large suite of CMS conditioned on multiple T* (3) Fewer CMS based on ASCE 7 recommendations (4) Fewer CMS based on C&A14 recommendations
Find:	Find if (3) and (4) are capable of estimating the peak EDPs rather than having to resort to (2), compare with what one would get using (1), and quantify the conservatism reduction.
Experimental Design	Case study borrowing a 42-story RC shear wall detailed model from another study.
Test Subjects	
	Results
Baseline for comparison	(1) Use of the UHS always leads to higher demands because it is unconservative in nature, hence the reason the CMS was inroduced. (2) Resutls from a large set of CMS covering a large range of T* enables evaluating the effectiveness of the two simplified approaches, (3) and (4).
Metric for comparison	Difference in peak EDPs obtained from each approach, illustrated on the figures and documented in the text.
Difference from baseline	(3) is found to do a good job when reasonable conditioning periods are chosen, (4) is a bit more conservative, but still less conservative than using the UHS directly as a target.
	Conclusions
Authors'	- While drifts are maximized at around T* = T1, shears and accelerations are maximizeed when T* is near the higher modes. - Both simplified approaches reduce the computational burden without being unconservative. - The T* that maximizes the EDPs also maximizes the correlation between Sa(T*) and the considered EDP (which is both interesting and useful). - Using only 11 ground motions as per the code minimum introduces a lot of aleatory variability in the results, which may be unconservative.
Yours	- I am puzzled about the implications of these findings on risk analysis. For loss estimation, I haven't seen any forumlations using multiple target spectra for the same hazard level. Existing research suggests that the conditioning period does not affect the loss estimation results when using Conditional Spectra (CS) as targets. I am wondering if this is true, given the fact that a large amount of loss is driven by acceleration sensitive components, whose demand is driven by the higher modes.
Applications	Ground motion selection for earthquake resistant structural design.