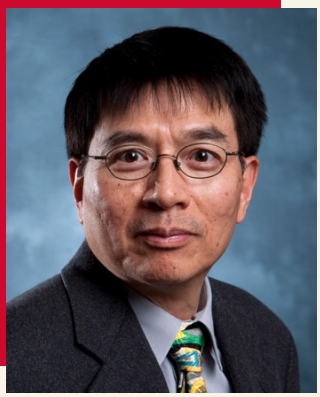
Mar 22, 2024

WHERE DO WE STAND ON METAMATERIAL-BASED SEISMIC DESIGN OF ENGINEERING STRUCTURES?



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ABSTRACT

Conventional seismic isolation systems for engineering structures are effective in reducing the damaging effects of the horizontal components of a vibration, but they are not well suited for protection against the vertical components of dynamic loads. They are also prone to rocking, further complicating the design. Metamaterial-based seismic isolators are very attractive because they can overcome the disadvantages existing in conventional seismic isolation systems. These metamaterial-based seismic isolators use the foundation of engineering structures to block or reflect the damaging seismic motion being transmitted to the engineering structures. This paper presents both the analytical and experimental studies to demonstrate the feasibility and effectiveness of the metamaterial-based seismic isolators. To date, where we stand on metamaterial-based seismic design of engineering structures is critically examined. Guided by solid-state physics, the seismic isolators can be made by the metamaterial to exhibit frequency band gaps that are useful in resisting the seismic waves imposed on engineering structures from earthquake disturbances. Possessing distinct frequency band gaps, this metamaterial will block, or reflect, the incoming seismic motion with the frequencies falling between these gaps. We properly designed the frequency band gaps to match the fundamental frequency of an earthquake, so that its dynamic response is greatly reduced.

BIOGRAPHY

Y. L. Mo, Ph.D., P.E., is a professor in the Civil and Environmental Engineering Department at the University of Houston, Houston, Texas, USA. He has a Ph.D. in structural engineering from the University of Hannover, Hannover, Germany and more than 30 years experience in experimental and model-based simulation studies of reinforced, prestressed and steel plate concrete structures subjected to static and dynamic loading. He has written eight books and book chapters, more than 157 technical journal, and 152 conference papers, and 51 technical reports, has delivered 48 invited lectures and holds 6 awarded and 2 pending patents. Based on his research performance he has received the Alexander von Humboldt Research Fellow Award from Germany and the Distinguished Research Award from the National Science Council of Taiwan.

Seminar Details

Friday, Mar 22, 2024
2:30pm – 4:00pm

UH Science Building
Room S105

Online via Teams
https://www.cive.uh.edu/research/beyer-distinguished-lecture