

**Department of Structural Engineering
University of California, San Diego
SE 290 Seminar**



Antonio Palermo
Mechanical and Civil Engineering
California Institute of Technology

“Elastic Metamaterials for Seismic Surface Waves Attenuation”

Monday, November 19, 2018
12:00 pm - 12:50 pm, Pepper Canyon Hall, Room 122

<https://structures.ucsd.edu/seminars>

Abstract

Elastic metamaterials are artificial composites with resonant elements hosted in a medium able to manipulate the propagation of elastic waves. When the resonant elements are placed on the free surface of an elastic medium, they form a “metasurface” that allows to fully control the dynamics of surface waves. In this talk, I will discuss the use of resonant metasurfaces to attenuate the propagation of vertically and horizontally polarized surface waves and their possible application for seismic waves attenuation. By combining analytical, numerical, and experimental studies, I will describe the interaction of Rayleigh waves with a metasurface of vertical resonators and the design of large-scale barriers to deflect damaging seismic Rayleigh waves into the medium bulk. Additionally, I will discuss the effect of soil stratification on the metasurface dynamics by analyzing the propagation of surface waves in granular media with depth-dependent stiffness profile. Finally, I will show how these same concepts can be applied to mitigate the propagation of bulk and surface shear polarized waves, e.g. Love waves, and discuss the mitigation of site amplification effects using the same resonant barriers.

Biography

Antonio Palermo is the “Cecil and Sally Drinkward Postdoctoral Fellow” in the Department of Mechanical and Civil Engineering at the California Institute of Technology. His research interests lie at the intersection between applied physics, solid mechanics, and civil engineering with the aim of designing novel materials and structures for elastic wave propagation control. He received his Ph.D in Structural Engineering from the University of Bologna, Italy, investigating the use of periodic and resonant materials for seismic isolation purposes. For his dissertation, he has been awarded the “Claudio Bonivento Thesis Prize for Research and Technological Innovation”. He received his MSc in Earthquake Engineering from Imperial College, UK, and his Civil Engineering degree from the University of Bologna.

*Sponsored by Professor Francesco Lanza Di Scalea
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