



PHYSICS COLLOQUIUM 293

Physics of Earthquakes and Tsunamis

Eric M. Dunham
Department of Geophysics
Stanford University

Date: 4/20/18
Time: 10:45 AM
Location: SSB 120

For more information contact:
Jing Xu
jxing8@ucmerced.edu

ABSTRACT

Earthquakes and tsunamis are natural hazards that we face as residents of California and the western United States. This talk provides an overview of the physics of these hazards, spanning both well-established understanding as well as current research frontiers. Special focus is on mathematical idealizations, based on continuum mechanics, and computer simulations of the governing partial differential equations. We will explore how earthquakes propagate as shear fractures on fault surfaces, radiating seismic waves (i.e., ground shaking) as they encounter geometric complexities and/or heterogeneities in frictional properties. Earthquake ruptures extend down to 10-15 km depth, where elevated temperatures allow polycrystalline rocks to flow via dislocations and related defects, rather than failing via brittle fracture as occurs closer to Earth's surface. We will also examine how offshore earthquakes deform the seafloor, generating tsunamis. Our simulations of the coupled Earth-ocean problem with gravity resolve open issues in the tsunami generation process, and also suggest how ocean bottom sensor networks that are coming online in Japan and else can be used for tsunami early warning.

BIO:

Eric M. Dunham is an Associate Professor in the Department of Geophysics at Stanford University and an affiliated faculty member with Stanford's Institute for Computational and Mathematical Engineering. He received his PhD in Physics from the University of California, Santa Barbara, in 2005, before moving to Harvard University as a Reginald A. Daly postdoctoral fellow and later as a Lecturer on Applied Math. He has been a professor at Stanford since 2009. Drawing on his background in theoretical physics, Prof. Dunham uses modeling and computation to study natural hazards like earthquakes, volcanoes, and tsunamis. He is an Alfred P. Sloan Fellow in Physics and a recipient of the National Science Foundation CAREER award and the Stanford School of Earth Sciences Excellence in Teaching Award.

