High-Performance Computing Simulations of Broadband Ground Motions for an Mw 7.0 Hayward Fault Earthquake

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Abstract:
This talk will describe fully deterministic broadband (0-4 Hz) high-performance computing (HPC) ground motion simulations of a magnitude 7.0 scenario earthquake on the Hayward Fault (HF) in the San Francisco Bay Area of northern California. Our simulations rely on SW4, a fourth order finite difference code, and HPC systems at LLNL and LBNL. We use an average plane-layered (one-dimensional) model and a three-dimensional (3D) geologic/seismic structure developed by the United States Geologic Survey (USGS). Median ground motion intensities compare well ground motion models. For the 3D model, intensities display more scatter and dramatic differences across the HF due to geologic heterogeneity, with low wavespeeds east of the HF amplifying motions. We are investigating path effects using recordings of moderate (M 4) earthquakes in the region. Simulated ground motion time-histories enable engineering analysis of structures.