Use of Dynamic Rupture Models in Engineering Applications: Needs and Schedule

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Planned Use of Dynamic Rupture Models for Engineering Applications

• Splay faulting
  – Chance of splay faulting
  – Ground motion near splay faulting

• Creeping faults
  – Near fault ground motions from creeping faults

• Hanging wall effects (RV and NML)
  – Ground motion differences from FW to HW?

• Source parameter correlations
  – Inputs to kinematic simulations
PG&E Schedule Needs

• Q1 2014
  – Deadline for inputs to Southwestern US (SWUS) GM models (NPPs) – splay faulting

• 2015
  – Deadline for ground motion evaluations for dams near creeping faults

• 2018
  – Planned update of next empirical GMPE
  – Inputs from modeling by 2017

• 2023
  – Planned update of SWUS GM models in 2025
  – Inputs needed by Q4 2023
Splay Faulting

• SS faults (Q1 2014)
  – Probability of splay faulting for range of fault geometries
  – Source model for use in kinematic simulations
  – Ground motions from dynamic ruptures
    • Compare near fault ground motions from single faults and combined splay faults
    • Up to 5 Hz?
Validation

• Follow SCEC BB Platform validation exercise (2015-2016)
  – Comparison with past earthquakes (part A)
    • How well does the model work for an optimized source?
  – Comparison with averages from empirical GMPEs (Part B)
    • Are the inputs for the source leading to “centered” distributions of rupture parameters for future earthquakes?
  – Freq Range: up to 5 Hz
  – Identifies reliable range (Mag, Dist, freq)
Creeping Faults

• Source characteristics for creeping faults (Q4 2014)
  – Inputs to kinematic simulations

• Ground motions from dynamic rupture models (2017) for creeping faults
  – After validation complete
Hanging Wall Effects

• Use existing verified models (pre-validation) to compare with kinematic results (Q1 2014)
  – Compare the computed ground motions on FW and HW sides
  – Differences between NML and RV?

• Post Validation (2017)
  – Support for next set of empirical models due in 2018
  – Use ground motions from dynamic ruptures over the range identified by validation
Source Parameter Correlations

• Inputs to Dynamic Ruptures (2014)
  – What are the distributions on the inputs?
  – Variability of results ground motions?

• Constraints on kinematic source inputs (2015)
  – Update from past work
  – What do rare (unusually severe) earthquake sources look like?