



Southern California Earthquake Center
Studying earthquakes and their effects in California and beyond

Creating an Updatable Version of the Community Fault Model (CFM) for use by Earthquake Simulators

Conveners: Terry Tullis, Michael Barall, Jim Dieterich, Ned Field, and Scott Marshall

The SCEC Community Fault Model (CFM) is the most detailed description of the geometry of faults in California. As such it is the logical fault description to be used by future increasingly detailed simulations of long historic earthquake sequences. However, several problems arise in trying to use the CFM in Earthquake Simulators. The purpose of this workshop is to discuss these problems and potential solutions to them by a small and diverse group of specialists in order to define how and by whom the CFM can be made useful for Earthquake Simulators. An additional intent is to define a process by which future updates to the CFM can be easily made usable by Earthquake Simulators.



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Sunday, September 10, 2017

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|---|-----------------------|
| 1:00 Introduction and goals of workshop | <i>Terry Tullis</i> |
| 1:10 Brief Description of 2015 attempt to do this | <i>Michael Barall</i> |
| 1:30 Discussion of what shape elements to use and how to create them | <i>Terry Tullis</i> |
| 1:45 Remeshing the CFM for use in boundary element method models | <i>Scott Marshall</i> |
| 2:00 Discussion of best way to flatten topography | <i>All</i> |
| 2:15 Overview of efforts to determine slip rates and rakes in UCERF3 | <i>Ned Field</i> |
| 2:30 Discussion of what can be done to determine slip rates and rakes for faults in the CFM | <i>All</i> |
| 2:45 Break | |
| 3:00 Current plans for ongoing improvements to the CFM | <i>Andreas Plesch</i> |
| 3:15 Discussion of how the CFM process could be augmented to include a version without topography and with slip-rate and slip-rake data | <i>All</i> |
| 3:30 Discussion of who is interested in being part of a collaborative proposal to create an initial CFM-EQSIM and what role they would play | <i>All</i> |
| 4:00 Discussion of how could future updates to the CFM lead to the same version of an updated CFM-EQSIM | <i>All</i> |
| 4:15 General discussion of issues that were short-changed | <i>All</i> |
| 5:00 Adjourn | |

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Among the problems to be solved are the following:

- How best to create CFM versions that involve roughly equal-sized and equant-shaped elements and whether grids should be created having triangular elements, rectangular elements, or both.
- The top edges of the faults in the CFM follow actual topography, but Earthquake Simulators require an upper planar surface on a half-space, so a version of the CFM needs to be created in which the topography is somehow flattened.
- The CFM contains fault geometry, but does not have either slip rates or slip rakes, both of which are needed by Earthquake Simulators which currently are loaded by back slip. Some method is needed to assign slip rates and rakes for the many faults having no such data and also to reconcile the many instances where finding a simple correspondence between the faults included in the CFM and those included in UCERF3 for which slip-rate and slip-rake data do exist.



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The hope is that from this workshop will emerge:

- A consensus as to the best way to solve these problems
- A team of individuals who will agree to do collaborate via one or more SCEC proposals to do the required work
- An approach is developed so that once an initial CFM-EQSIM is created it can easily be updated as improvements are made to the CFM



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