Final Project Summary — PEER Lifelines Program

Project Title—**ID Number**	*1-D Rock Motion Simulations*—**1L08**		
Start/End Dates	12/1/03 6/30/04	Budget/ Funding Source	$80,000 / PG&E-CEC
Project Leader (boldface) and Other Team Members	**Walter Silva (PEA)**		

1. Project goals and objectives
Develop a data set of simulated strong ground motions for a suite of strike slip and reverse slip earthquakes at about 150 site locations. Part of the project included validating the simulation methodology with six recent earthquakes for recordings at about 100 sites.

2. Benefits of the results of this project to develop technologies and protocols to mitigate the vulnerability of electric systems and other lifelines to damage directly and indirectly caused by earthquakes. Also, benefits to develop assessment techniques to evaluate damage to electric systems caused by earthquakes and to assess fiscal impacts due to the loss of electric service to the community.
Simulated motions were developed to provide guidance in developing empirical attenuation relations for the PEER NGA project.

3. Brief description of the accomplishments of the project
Over 300,000 motions were simulated for magnitudes ranging from **M** 6.5 to **M** 7.8 at various azimuths and rupture distances (out to about 200 km).

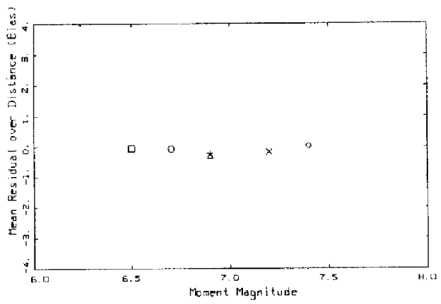
4. Describe any instances where you are aware that your results have been used in industry
Results are to be used in the PEER NGA project by the developers of attenuation relations.

5. Methodology employed
The stochastic finite fault methodology developed by Pacific Engineering was used. Examples of the validation results are shown in Figure 1 for mean residual over all sites. Figure 2 shows mean residual (at five seconds) verses a directivity parameter for all sites within a 20 km rupture distance.

6. Other related work conducted within and/or outside PEER
Two other modeling teams with distinct simulation methodologies simulated the same suit of earthquakes and site locations.

7. Recommendations for the future work: what do you think should be done next?
More realistic crustal parameters should be used so direct comparisons to motions from California attenuation relations can be made at absolute levels.

8. Author(s), Title, and Date for the final report for this project
Report is pending.



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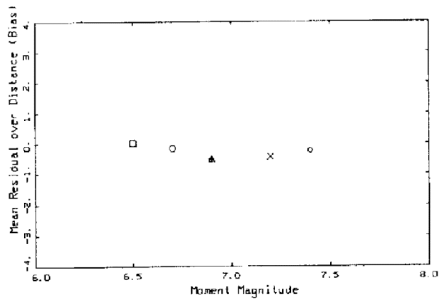

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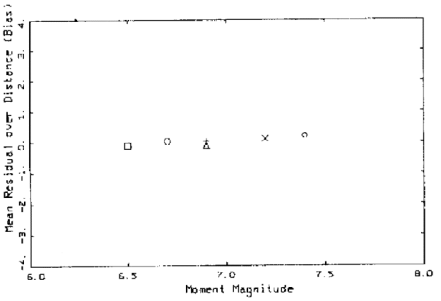

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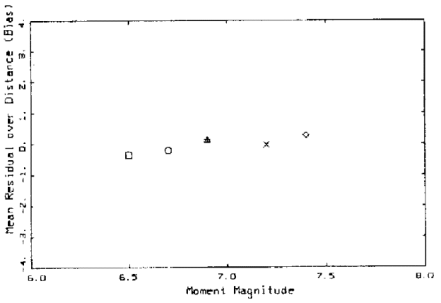

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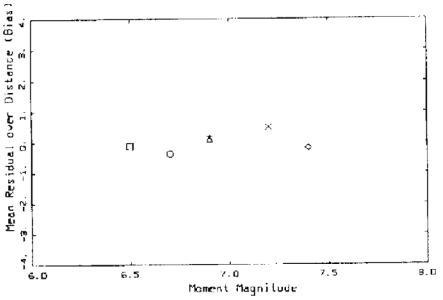

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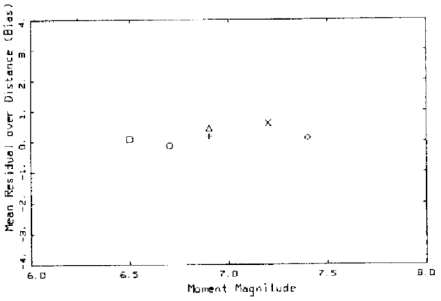

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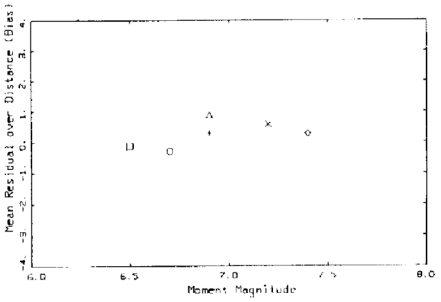

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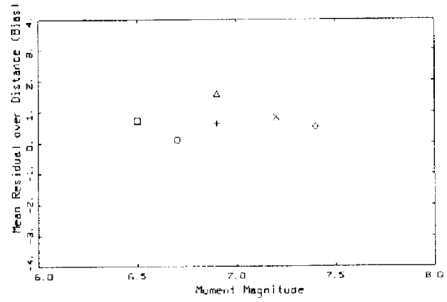

6 EARTHQUAKES ALL SITES BL
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LEGEND

□	□	IMPERIAL VALLEY
○	○	NORTHRIDGE
△	△	LOMA PRIETA
+	+	KOBE
×	×	LANDERS
◇	◇	KOCAELI

Figure 1.

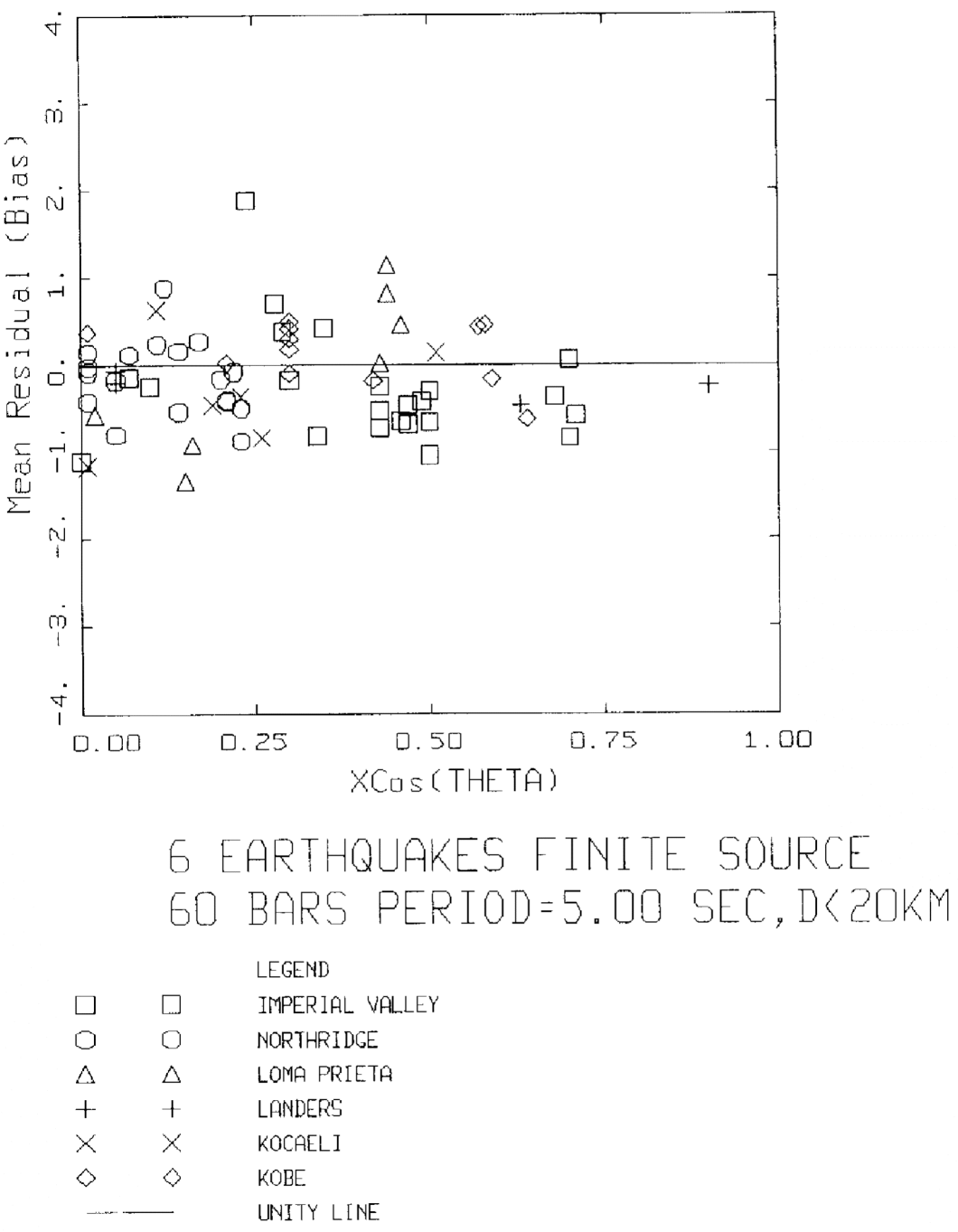
Mean Residual (Bias)
4.
3.
2.
1.
0.
-1.
-2.
-3.
-4.
0.00
0.25
0.50
0.75
1.00
XCos(THETA)
6 EARTHQUAKES FINITE SOURCE
60 BARS PERIOD=5.00 SEC, D<20KM
LEGEND
IMPERIAL VALLEY
NORTHRIDGE
LOMA PRIETA
LANDERS
KOCAELI
KOBE
UNITY LINE

Figure 2.