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Earthquake Spectra **15**, pp. 557-564 (1999); doi:10.1193/1.1586058

## Relationships between Peak Ground Acceleration, Peak Ground Velocity, and Modified Mercalli Intensity in California

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We have developed regression relationships between Modified Mercalli Intensity ( $I_{mm}$ ) and peak ground acceleration (PGA) and velocity (PGV) by comparing horizontal peak ground motions to observed intensities for eight significant California earthquakes. For the limited range of Modified Mercalli intensities ( $I_{mm}$ ), we find that for peak acceleration with  $V \leq I_{mm} \leq VIII$ ,  $I_{mm} = 3.66 \log(PGA) - 1.66$ , and for peak velocity with  $V \leq I_{mm} \leq IX$ ,  $I_{mm} = 3.47 \log(PGV) + 2.35$ . From comparison with observed intensity maps, we find that a combined regression based on peak velocity for intensity  $> VII$  and on peak acceleration for intensity  $< VII$  is most suitable for reproducing observed  $I_{mm}$  patterns, consistent with high intensities being related to damage (proportional to ground velocity) and with lower intensities determined by felt accounts (most sensitive to higher-frequency ground acceleration). These new  $I_{mm}$  relationships are significantly different from the Trifunac and Brady (1975) correlations, which have been used extensively in loss estimation.

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### KEYWORDS and PACS

#### Keywords

Earthquake intensities, maximum ground acceleration, maximum ground velocity, Northridge earthquake, Jan. 17, 1994, Landers earthquake, June 28, 1992, Sierra Nevada earthquake, June 28, 1991, Loma Prieta earthquake, Oct. 17, 1989, Whittier earthquake, Oct. 1, 1987, North Palmdale California earthquake, July 8, 1986, California earthquake, Oct. 15, 1979, California earthquake, Feb. 9, 1971 intensities

### ARTICLE DATA

#### Permalink

<http://dx.doi.org/10.1193/1.1586058>

### PUBLICATION DATA

#### ISSN:

8755-2930 (print)

#### Publisher:

Earthquake Spectra

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