Recent and future developments in earthquake ground motion estimation

John Douglas, Benjamin Edwards

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Recent and future developments in earthquake ground motion estimation

John Douglas[a,*], Benjamin Edwards[b]

[a] *Department of Civil and Environmental Engineering; University of Strathclyde; James Weir Building; 75 Montrose Street; Glasgow; G1 1XJ; United Kingdom*
[b] *Department of Earth, Ocean and Ecological Sciences; School of Environmental Sciences; University of Liverpool; Jane Herdman Building; Liverpool; L69 3GP; United Kingdom*

Abstract

Seismic hazard analyses (SHA) are routinely carried out around the world to understand the hazard, and consequently the risk, posed by earthquake activity. Whether single scenario, deterministic analyses, or state-of-the art probabilistic approaches, considering all possible events, a founding pillar of SHA is the estimation of the ground-shaking field from potential future earthquakes. Early models accounted for simple observations, such that ground shaking from larger earthquakes is stronger and that ground motion tends to attenuate rapidly away from the earthquake source. The first ground motion prediction equations (GMPEs) were, therefore, developed with as few as two principal predictor variables: magnitude and distance.

Despite the significant growth of computer power over the last few decades, and with it the possibility to compute kinematic or dynamic rupture models coupled with simulations of 3D wave propagation, the simple parametric GMPE has remained the tool of choice for hazard analysts. There are numerous reasons for this. First and foremost GMPEs are robust and reliable

*Corresponding author
Email addresses: john.douglas@strath.ac.uk (John Douglas), ben.edwards@liverpool.ac.uk (Benjamin Edwards)