



Intra Plate Stresses Using Finite Element Modelling

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Abstract

One of the most challenging problems in the estimation of seismic hazard is the ability to quantify seismic activity. Empirical models based on the available earthquake catalogue are often used to obtain activity of source regions. The major limitation with this approach is the lack of sufficient data near a specified source. The non-availability of data poses difficulties in obtaining distribution of earthquakes with large return periods. Such events recur over geological time scales during which tectonic processes, including mantle convection, formation of faults and new plate boundaries, are likely to take place. The availability of geometries of plate boundaries, plate driving forces, lithospheric stress field and GPS measurements has provided numerous insights on the mechanics of tectonic plates. In this article, a 2D finite element model of Indo-Australian plate is developed with the focus of representing seismic activity in India. The effect of large scale geological features including sedimentary basins, fold belts and cratons on the stress field in India is explored in this study. In order to address long term behaviour, the orientation of stress field and tectonic faults of the present Indo-Australian plate are compared with a reconstructed stress field from the early Miocene (20 Ma).

Key words: seismic hazard, seismic activity, finite element model, palaeo-stress, optimisation.