Deterministic and Probabilistic Seismic Hazard Analysis of Dholera region

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The Dholera region in Ahmedabad district is in the proposed Delhi-Mumbai industrial corridor. The region comes under zone III of the seismic zoning map of India (IS 1893-2002). The catalogue of historical earthquakes shows an earthquake of intensity VII or M5 at Ghogha (Bhavnagar) in 1919. It might have occurred along a sympathetic fault to the West Cambay Fault (WCF). This fault passes through the Eastern margin of the area and is not active in last 90 years as only a few M<4 shocks have occurred. The Maximum Credible earthquake (MCE) along the WCF will be one level higher than what intensity has already been felt in nearby areas. Hence, intensity VIII will give a maximum M 6.0 earthquake as MCE. We tried to simulate ground motion due to Mw 6.0 earthquake along this fault using stochastic finite modeling technique with dynamic corner frequency approach (Motazedian and Atkinson, 2005). The fault is sub-divided into sub-faults of 1 x 1 km. The ground motion contributions from each sub-fault is computed stochastically and then summed up at the observation point with a time delay, thereby obtaining ground motion from the entire fault. The simulations are carried out for base rock with shear wave velocity of 760 m/sec. The seismic hazard due to WCF is much less being at the most 0.045 to 0.115 g in the Dholera region. The probabilistic analysis is also carried out involving all possible seismic sources around the region in question. The probabilistic analysis of Dholera region for 2% and 10% probability of exceedance of PGA in 50 years with contribution from area sources is determined. The PGA varies between 0.05 g – 0.1 g for 2% PE in 50 years and 0.01g – .05g for 10% PE in 50 years.