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Simulation Through Analytical 3D Method: The Ray-Tracing and Modal Summation Technique in the WKBJ-Approximation

Analytical simulation methods help us to understand real behavior of earthquake physics and nature which can give us some measurable parameters to discriminate earthquakes, to make realistic hazard plans and to create reliable data bank of earth motion synthetic record, where true data is not available. In order to enable reliable estimation of the ground motion response to an earthquake, 3D velocity models have to be considered. At present study, we use an innovative methodology for computing synthetic seismograms, complete of the main direct, refracted, converted phases and surface waves in three-dimensional anelastic models based on the combination of the Modal Summation technique with the Asymptotic Ray Theory in the framework of the WKBJ –approximation. The 3D models are constructed using a set of vertically heterogeneous sections (1D structures) on a regular grid. 3D models are constructed in such a way to fulfill the requirement of weak lateral inhomogeneity in order to satisfy the condition of applicability of the WKBJ – approximation, i.e. the lateral variation of all the elastic parameters has to be small with respect to the prevailing wavelength. The method has been used to study the 26 December 2003, Bam earthquake, Mw= 6.6.

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