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3D numerical modeling of earthquake motion in Colfiorito basin during the Umbria-Marche, Italy, seismic sequence

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On September 26, 1997, two moderate damaging earthquakes occurred in Umbria-Marche, northern Apennines, Italy. The epicenters were close (R$<$5 km) to a small (3-km wide) shallow sedimentary basin near Colfiorito. The two earthquakes were followed by the seismic sequence that lasted until April 8, 1998. Many earthquakes were recorded by the temporary four-station small-aperture array installed in the basin after the main events. The recorded motion makes a very good database for investigations of the effect the basin sediments may have on the earthquake motion. The earthquake waveforms indicate the occurrence of a significant resonance of the soft sedimentary fill consisting of lateral debris fans mixed with lacustrine sandy-clayey deposits. While the resonance dominates the first part of the motion, laterally propagating waves generated at the basin's edge arrive at later times. The back azimuth of the diffracted waves is systematically different from that of the epicenter.

Because previous studies made it possible to construct a computational model of the Colfiorito basin, a numerical 3D modeling is used to attempt explaining the mechanisms causing the observed features of the earthquake motion, and, particularly, its large amplitudes and duration. The numerical simulations were performed using a finite-difference method (4^{th}-order staggered-grid displacement-velocity-stress scheme). Two local events were simulated with the double-couple point sources. The synthetic and observed motions are compared in the time, frequency and time-frequency domains. The simulations will be followed by simulations for other earth-

quakes of the sequence with different source azimuths and hypocentral depths.