Electric field variations due to ground velocity with variable frequencies in the seismic dynamo effect

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We have so far observed clear electric field variations coincident with the passage of seismic waves. Resonance-like motion of ion in groundwater under the Earth's magnetic field gives rise to circularly polarized electric field, as proposed by Honkura et al. (2009). On 25-26 July 2011, an experiment for studies of crustal seismic structure was made in central Japan. On this occasion, simultaneous observations of ground velocity and electric field were carried out at three sites near a blasting point using 50 kg of dynamite. At each site, installed are a short-period seismometer of velocity type, whose natural frequency is 2 Hz, electrodes of Pb-$PbCl_2$ type, and two data loggers which has 3 channel inputs, 1 kHz sampling rate, and 18-bit resolution. The dipole length to observe the electric field was set at 15 m. Then we could obtain the waveforms of ground velocity and electric field very clearly. Some trajectories of electric field at the Earth's surface suggest that the direction of electric field polarization could change with respect to the time. Hence, to investigate temporal variations of the frequency response in the seismic dynamo effect, we have applied the continuous wavelet transform analysis to the records of ground velocity and electric field. We show characteristics of electric field variations due to ground velocity with variable dominant frequencies.