

Determination of frictional characteristics and evaluation of strong motion by dynamic rupture simulations of the Kamishiro fault at the 2014 Northern Nagano earthquake

*Takeshi Miyamoto¹, Kenichi Tsuda², Tetsuro Hirono¹

1. Department of Earth and Space Science, Graduate School of Science, Osaka University, 2. Institute of Technology, Shimizu Corporation

On 22 Nov. 2014, a large earthquake (M_w 6.2) occurred at the northern of Nagano prefecture. The surface ruptures were observed along the Kamishiro fault, a northern part of the Itoigawa-Shizuoka tectonic line. In order to investigate the relationship between the frictional characteristics of the fault and the seismic waves observed on the surface, we performed friction experiments using the fault-related samples recovered from the Kamishiro fault at the Iida trench, and then evaluated the spatiotemporal evolution of the rupture process during the earthquake by using dynamic simulation on the basis of the friction properties determined. The friction experiments were performed under wet conditions with 1 MPa axial stress and 55 cm/s and 200 μ m/s equivalent slip speeds. The initial, peak, and dynamic friction coefficients were determined to be 0.495, 0.708, and 0.269-0.288, respectively. The simulated fault slip near the surface was calculated to be about 10 m, which is well coincided to that analyzed by a previous research. However, the Fourier spectra of the slip velocity showed that the amplitudes have maximum at the smallest frequency and become smaller as frequency becomes larger, which are different from those of the observed ground motion.

Keywords: frictional characteristics, dynamic rupture simulation