# Attenuation relationship pf peak ground velocity (PGV) inferred from K-NET data

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(1) Attenuation relationship of PGV

Peak ground velocity is effective index of strong-ground motions and is often used for earthquake engineering purposes such as earthquake resistance design and earthquake hazard prediction. In this study, the attenuation relationship of PGV is inferred from K-NET strong motion data.

Since K-NET strong motion data are acceleration, they were transformed into velocity data by numerical integration. The velocities integrated were visually examined in contamination of long-period seismic noise. Contaminated velocity data are eliminated from inference of the attenuation relationship.

It was examined of whether fault types, source depths and site conditions are effective on the attenuation relationship. It resulted in that source depths and site conditions are effective parameters but fault types are not.

The inferred regression formula of the attenuation relationship for PGA of horizontal motions is

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where is the magnitude scale of Japan meteorological agency. , , are focal depths, shortest distance from fault surface, and site amplification.

A regression formula of the attenuation relationship for PGA of vertical motions was also inferred. At first, the attenuation relationship of the ratio of PGV for the vertical component to PGA for the horizontal component were planned to infer. However, it was found that there are two types of the ratios: one is dependent on the distance and the other is independent from the distance. Although we investigated the cause for the two types of the ratios, we could not find it. Therefore, we decided to infer the attenuation relationship of PGV for the vertical component. The regression formula is

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(2) Characteristics of the attenuation relationships

In comparison with the attenuation relationship of peak ground acceleration (PGA), we find two features. The first is that the PGV relationship reflects amplification by the site conditions more clearly. This is probably due to strong damping of high frequency motions through sediments. The second is that the attenuation relationships of PGA depend on focal depths but the attenuation relationships of PGV do not.

We take ratios of PGA to PGV just above faults. They show strong dependence of focal depths. The ratios for shallow earthquakes of focal depth between 10km and 20km are above and increase with the focal depth. This means that deep earthquakes radiate high acceleration but comparatively small velocity. We investigate the relation of strong-motion areas (for example area of ground shaking above 100gal) with focal depths. It shows that the strong-motion area become wider with increasing focal depth.