

Estimation of bedrock structure in Hiroshima, west Japan using microtremors of three components

Hitoshi Morikawa[1], Keiichi Nishimura[2]

[1] Dep. of Built Environment, Tokyo Inst. of Tech., [2] Fac.of Informatics, Okayama Univ. of Sci.

<http://www.enveng.titech.ac.jp/morikawa/>

To determine the ground velocity structure in Hiroshima, Japan, we have carried out the array observation of microtremors.

We used the following system; that is, the velocity type seismometer whose natural period is about 10 second, amplifier, digital recorder with 16bit resolution, and GPS clock. Using three components sensors, the microtremors were simultaneously recorded at four sites, located on vertices of equilateral triangle array and its center. The area of observation is located around the Mitsubishi ground near the Hiroshima-Nishi Air port. We set the center site in the Mitsubishi ground and three sizes of array whose radius are 84m, 184m, 431m.

The observation was carried out from midnight on Dec. 8, 2001 to the next morning. The recorded data length is 10 minutes for large array, and 340 seconds for middle and small array. The observation was repeated three times at same site. The data was recored through the low pass filter with cut off frequency 10Hz and with sampling frequency of 200Hz for large array, and 500Hz for middle and small array.

We have estimated not only the phase velocity of Rayleigh wave but also that of Love wave using the technique provided by Okada and Matsushima (1990) and Yamamoto (1998).

The phase velocity thus obtained has good quality, because the estimated values from one array are overlapped with those estimated from another array of different size. From this result, we estimate the ground velocity structure using the technique of forward modeling.

The result is the following:

thickness	density	Vs	Vp
[m]	[t/m ³]	[km/s]	[km/s]
15	1.8	0.12	1.7
22	1.8	0.20	1.8
80	2.0	0.45	2.2
--	2.7	3.30	5.4

The theoretical dispersion curve obtained from the above structure is in agreement with the observed one both for Rayleigh and Love waves. Furthermore, this result corresponds with the boring data. From this, we can conclude the result is reliable.