



Extract high-frequency Rayleigh wave's multimode dispersion curves from urban ambient /vibration through Vector Wavenumber Transform Method(VWTM)

Xueyan Li (1), Xiaofei Chen (2), and Zhentao Yang (2)

(1) University of Science and Technology of China, Hefei, Anhui, China (lixueyan@mail.ustc.edu.cn), (2) Southern University of Science and Technology, Shenzhen, Guangdong, China

Ambient vibration/noise (passive surface wave) is a relatively new method that has attracted an increased attention in recent years. The main advantages of the methods are low cost and environmentally friendly. But, it's a hot topic to extract high-mode dispersion curves which have strong constraint of structure. Recently, Xiaofei Chen proposed the vector wavenumber transform method (VWTM).

In this study, we extract high-frequency Rayleigh wave's multimode dispersion curves from urban ambient vibration by the vector wavenumber transform method (VWTM). First, we evaluate the performance of VWTM by applying it to the synthetic data, and by comparing to the theoretical dispersion curves. Next, we apply the VWTM to engineering exploration in Shanghai China, and get high-resolution fundamental and higher-mode dispersion curves. Through comparative analysis with borehole data, we find the stratigraphic profile which obtained from the inversion with higher-mode dispersion curves is almost identical to stratigraphic texture. Because of the strong constraint of the higher-mode dispersion curves, the uncertainty of the inversion is greatly reduced.

We find that VWTM is a practical and effective urban ambient vibration/noise processing method that can be used for the urban stratigraphic division, the buried depth of the bed rock.