



Surface Wave Dispersion in 2D Multilayered Media with irregular Interfaces

Yuxiang Liu (1,2) and Xiaofei Chen (2)

(1) School of Earth and Space Sciences, University of Science and Technology of China, Hefei, Anhui, China (yxliu17@mail.ustc.edu.cn), (2) Department of Earth and Space Sciences, Southern University of Science and Technology, Shenzhen, China

The theory of seismic surface waves plays an important role in seismic inversion and structure exploration. The study of classic seismic surface wave starts from Haskell (Haskell, 1953), then it grows under efforts of Keilis-Borok and Yanovskaya(1962), Knopoff (1964), and many other pioneers. Chen (1990) proposed Global Generalized Reflection/Transmission Method (GGRTM) to generate synthetic seismograms in 2D multilayered media with irregular interfaces. Based on GGRTM, Chen (1999,2007) derives new fundamental propagation equation of Love waves in irregular multilayered media. This new theory describes the model solution and excitation of Love waves in quite arbitrary media. When interfaces are flat, the new theory becomes identical to the classic theory which is only suitable in homogeneous multilayered media, suggesting that GGRTM is a perfect extension of the classic seismic surface theory.

In this study, we derive the fundamental formulations of Rayleigh waves in irregular multilayered media based on GGRTM. We propose a new approach to the dispersion curves of Love waves and Rayleigh waves.

In our new theory, the dispersion curves become dispersion surface due to an irregular interface. With a given order and a given frequency, there is not only one but a set of wave slowness that satisfies the formulations in an irregular multilayered media. All the satisfied wave slowness form a surface which we call “the dispersion surface”. The characteristics of Love and Rayleigh wave dispersion surfaces are investigated through the results of different typical interface structures and in different scales. We also calculate the dispersion surface on a real crust structure to show the influence of topography on surface wave dispersion.