

## Two-Step Inversion Method for Multi-mode Surface Waves

**Authors :** Ying Zhang

**Abstract :** Surface waves provide critical constraints about the earth's structure in the crust and upper mantle. However, different modes of Love waves with close group velocities often arrive at a similar time and interfere with each other. This problem is typical for Love waves at intermediate periods that travel through the oceanic lithosphere. Therefore, we developed a two-step inversion approach to separate the waveforms of the fundamental and first higher mode of Love waves. We first solve the phase velocities of the two modes and their amplitude ratios. The misfit function is based on the sum of phase differences among the station pairs. We then solve the absolute amplitudes of the two modes and their initial phases using obtained phase velocities and amplitude ratio. The separated waveforms of each mode from the two-step inversion method can be further used in surface wave tomography to improve model resolution.

**Keywords :** surface wave inversion, waveform separation, love waves, higher-mode interference

**Conference Title :** ICGG 2023 : International Conference on Geology and Geophysics

**Conference Location :** Boston, United States

**Conference Dates :** April 17-18, 2023