Inversion of the Earth's free oscillation spectra for isotropic and anisotropic structure

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The Earth's free oscillation spectra have been extensively analyzed to infer laterally heterogeneous structure of the isotropic velocity of the seismic waves in the Earth. Anisotropy of the seismic waves, as well as lateral heterogeneity of the isotropic velocity, splits a degenerate free oscillation spectrum of the spherical symmetric Earth and causes adjacent free oscillation modes to interfere. Thus the free oscillation spectrum on which the mode interference appears must informs us about both the heterogeneity and anisotropiy of seismic velocity. In order to retrieve the anisotropic and isotropic lateral structure of the Earth form the free oscillation spectra, we developed a spectral inversion method incorporating the interference between toroidal and spheroidal modes. Applying the spectral inversion method to artificial spectral data which is calculated for a given isotropic and anisotropic structure, we verified that the given structure is retrieved correctly from the free oscillation spectral data. When the mode interaction is not taken into account for the spectral inversion, the resultant structure of isotropic velocity is far different from the given isotropic structure. Therefore, we must allow for the mode interaction to estimate the velocity structure correctly from the Earth's free oscillation spectra.