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A Formulation of Free Oscillations of the Azimuthally Anisotropic Earth and Its Possible Applications

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An analytical formulation for free oscillations of the Earth having azimuthal anisotropy is obtained. Based on the framework of generalized spherical harmonics by Phinney and Burridge (1973), the first order differential equations of motion are derived, which are consistent with the so-called y-equations of Takeuchi and Saito (1972). For axial symmetric models of seismic wave velocities, the differential equations have a simple form for modes nS0, leading to a prediction that their eigenfrequencies have a four-lobed latitudinal dependence, even if the pattern of travel time anomalies for P waves passing through inner core has a two-lobed dependence.

Keywords: azimuthal anisotropy, free oscillation, generalized spherical harmonics, inner core