Hattori-Markowity wobble and the equatorial wave in the fluid core

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Hattori(1959) and Markowitz (1960) found out sudden displacements of the pole towards about 50 E (230 E). Markowitz showed that the wobble has a period of 24 years and an amplitude of 22 mas. The purpose of this report is to study Hattori-Markowitz wobble from fluid motions of the equatorial zone of the fluid core.Electromagnetic (Alfven) waves propagate through the fluid core along the main dipole with the period of about 20 years. We solve fluid motions in the tangent plane on the equator in the central part of the Pacific based on the equatorial beta-plane.We take approximations to the geostrophic balance on the horizontal flows, and we consider hydromagnetic motions with the buoyancy force in the vertical motions.We obtain the equatorial beta-plane solutions, with a very small gradient of the vertical component of velocity. Equatorial waves propagate eastwards and have discrete eigen values 2n + 1 (n = 0,1,2,...).The odd number indicated asymmetric modes relative to the equator.The equatorial wave with the 1st order (n=1) excites a relative angular momentum around the major axis of the triaxial ellipsoid (the central part of the Pacifi,165E) and induces a wobble to the pole. The equatorial wave with the 0th order excites a topographic torque at the core-mantle boundary near the major axis of the triaxial ellipsoid and induces changes of the Earth rotation. With numerical values, the wave length along the east-west direction to be 1000km, the amplitude of the vertical component of the velocity 10-3 m/s, and the flatterning 1x10-5, we obtain the amplitude of the oscillation along the major axis to be 16 mas, variations of the LOD 0.7x10-10.The magnitude of the electromagnetic coupling between relatively rotating core and mantle is estimated to be nearly the same magnitude of the observed values of the Earth rotation,provided that the coupling layer of the mantle is less than 10 km.