EFFECTS OF THE CORIOLIS FORCE ON LONG WAVES

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Recently long waves with periods of several minutes have been recognized as an exciting component to beach erosion, sedimentation in harbors, and oscillation of water. Due to earth rotation, the Coriolis force produces continuously, which may affect the long waves. The phenomenon of this Coriolis force on long waves has been discussed in the low and high frequency limit. Here, we have extended the effects of Coriolis force on the basis of equation of motion.

A two-dimensional equation of motion with Coriolis force generated by earth rotation has been derived analytically and obtained as,

$$\omega^2 = f^2 + ghK^2 \qquad \dots \ \dots \ \dots \ \dots \ \dots \ \dots (1)$$

In Eq. (1) if the wave period T is comparable to $2\pi/f$, the Coriolis effect will be significant, but if the wave period is much shorter then it will have no effect. In the case of shorter wave period (for high frequency, $\omega \gg f$), the wave frequency is consistent with the Kelvin waves. It can be also obtained that the wave amplitude and water particle velocity decrease exponentially in the positive y direction of the northern hemisphere (where f is positive). The effects of Coriolis force on long waves have been also discussed based on gravity waves propagating in an unbounded ocean, channel and basin. In a basin, the Cotidal lines have been found as curve and rotate counter clockwise around the origin.