Oceanography Department Seminar

SUNG YOON KIM

PROFESSOR
DEPARTMENT OF MECHANICAL ENGINEERING
KAIST, DAEJEON, REPUBLIC OF KOREA

"Elliptical near-inertial surface currents and modification of their temporal decays"

We interpret seasonal and cross-shore variability of near-inertial variances in the coastal radar-derived surface currents off Oregon with a fully extended slab layer model, allowing all non-linear terms of horizontal shear and strain components and anisotropic frictional terms, by investigating the roles of vorticity and divergence on the coastal near-inertial currents. Dominant clockwise variance and non-negligible counter-clockwise variance in the near-inertial frequency band appear as elliptical near-inertial motions. The ellipticity of the near-inertial currents, which appears as a regionally dominant clockwise polarization up to -0.5 offshore and -0.2 near the coast, is associated with vorticity, modifying the effective Coriolis frequency by up to half of the local Coriolis frequency. The temporal decay scales of near-inertial currents are enhanced in fall and winter and weakened in spring and summer, which are influenced by non-isotropic frictional coefficients and seasonal divergence and convergence related to ageostrophic currents. The proposed slab layer model shows that (1) the effective Coriolis frequency is modulated by background vorticity and difference of anisotropic frictional coefficients; (2) the effective frictional coefficient, including horizontal divergence terms, plays a role in accelerating and decelerating the temporal decay of near-inertial motions; and (3) The feasibility of the model in interpreting the near-inertial motions in the coastal regions where horizontal shear and strain flows and anisotropic bottom frictions become significant.

Thursday January 11th, 2024 3:00p.m. MSB #100