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Turbulence Statistics in the Inner Part of the Coastal Ocean Bottom Boundary Layer[1] ADITYA NAYAK, CHENG LI, BOBAK KIANI, JOSEPH KATZ, Johns Hopkins University — PIV measurements were performed in the inner part of the coastal bottom boundary layer under varying bottom roughness conditions, relative wave current orientation and ratio of mean current to amplitude of wave induced motion (WCR). Velocity distributions with resolution of 4.5 mm were obtained in two 28 x 28 cm^2 planes down to 5 mm off the seabed. Co-located ADV measurements were used to calculate Reynolds stresses by filtering out wave-induced motions from PIV data, and high-resolution sonar was used to map the bottom roughness. Mean velocity and Reynolds stress profiles varied with WCR and their relative alignment. An inflection in mean velocity profile developed below the log layer for WCR$\sim$1, but not for higher ratios. Reynolds stresses peaked in the lower portion of the log layer, decreasing with elevation above. The peak location, and the stress scaling trends depended on WCR. A second stress peak appeared just above the ripple crest. Wave-induced wall-normal momentum transport ("stress") became substantial within the roughness sublayer, where the relative phase between streamwise and vertical velocity components were altered. The dissipation rate profiles showed a rapid increase with decreasing elevation, but the shear production varied with WCR and roughness orientation.

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