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Study of Turbulence in Tidal Coastal Zone

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A high-frequency (1.2 MHz) four-beam Acoustic Doppler Current Profiler (ADCP) moored on the seabed has been used direct measurement turbulence in a shallow coastal zone of the eastern English Channel over four tidal cycles at period of development of the spring tide. As measurements and estimations have shown, the Reynolds stresses were found to vary regularly with the predominantly semidiurnal tidal flow with the stresses on the ebb flow (up to + 1.5 Pa) being generally greater than on the flood flow (-1.2 Pa). Turbulent kinetic energy () and its production rate (P) followed a regular cycle with the quarter-diurnal period and maximum values about 0.03 m2/s2 0.8 W/m3 respectively near the bed during ebb flow and decreasing sharply with height. and P were generally lowest 2•10-3 m2/s2 3•10-5 W/m3 respectively during the current reversal of low water, which matches a rapid transition from flood to ebb.

Obtained results have shown dominant role of tidal flow in control of structure and intensity of turbulence in bottom boundary layer and reveal a distinguish asymmetry in distribution of the turbulence associated with non-linearity of tidal cycle.

A special attention was paid to linear and non-linear interactions of surface waves and turbulence.