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ANALYSIS OF COASTAL CURRENT VELOCITY AND BOTTOM DRAG

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The knowledge of the velocity field is of pivotal importance for many planning activities, such as the evaluation of current-induced loading on maritime structures or the diffusion and dispersion of polluted flow discharges. To this aim, the ability to model marine currents can be a powerful device. In this work some observations of time-averaged velocity profiles, taken with a Vessel Mounted Acoustic Doppler Current Profiler (VM-ADCP) are analysed. The measurements were taken during a monitoring survey program in the seas of Southern Italy, under non-breaking conditions, offshore the surf zone, with the aim of reproducing the vertical trends of the streamwise velocity by means of standard theoretical laws. Together with velocity measurements, water temperature and salinity were also measured at the same time and locations, by means of a CTD recorder. In this way, the possible influence of stratification on the current velocity profile shape could also be evaluated. The examined surveys referred to different time periods and sites, to reach a general validity of deductions. On the basis of the experiments, we verified the actual existence of a log-layer and concluded that the upper limit of the region in which the log law is applicable extends well beyond the inner region. Moreover, the deviations of the measured velocity from the logarithmic profiles above the height of the log layer is consistent with the effects of stratification. The parameters of the log law were estimated, depending on both flow dynamics and stratification in the target area. As a second step, in the most superficial and stratified layer, the velocity profiles were modelled by means of a power law, which fitted the measured data well. Finally, the bottom stress and the bottom drag coefficient, affected by the presence of bed forms and vegetation, were examined.

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