



Wave-current interactions in deep water conditions: field measurements and analyses

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The study of wave – current interaction has drawn interest in oceanography, ocean engineering, maritime navigation and for tides or waves power device design.

In the context of the hydrodynamics study along the French Mediterranean coast, a current profiler was deployed near Toulon at the south of the “Port Cros” island. This coastal zone is characterized by a steep slope, the water depth varying from tens meters to several thousand meters over few kilometers from the coast. An ambient current, the “Northern Current”, coming from the Ligurian sea (area of Genoa, Italy) and following the coast up to Toulon, is present all over the year. Its mean surface velocity is of about 0.30 m/s, its flow rate of about 1.5 Sv. The region is exposed to two dominating winds: the Mistral, coming from North-West, and Eastern winds. Both generate swell and/or wind waves in either following or opposing current conditions with respect to the Northern Current.

A current profiler equipped with a wave tracking system (ACPD workhorse from RDI) was deployed from July to October 2014 in deep water conditions (depth of about 500m). The mooring system allowed the ADCP to measure the current profile from the sea surface down to 25m depth, which corresponds more or less to the depth of influence of waves of periods up to 10s.

The collected data include energetic wave conditions in either following or opposing current conditions. The current intensity and its vertical profiles have shown a significant temporal variability according to the meteorological conditions. Effects of the wave conditions on the current properties are discussed.

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