



Wave and current interaction in finite water depth : influence on the kinematics

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This experimental work on wave and current interaction has been done to better understand the influence of waves and bathymetry on current profile as well as the influence of current on waves refraction and dissipation. It completes the actual more general study made on current turbines and especially the influence of the waves on the vertical distribution of tidal stream from a high-order Boussinesq model.

The testing has been completed in the wave tank BGO-First, La Seyne/Mer, France. This tank is 24m long and 16m wide. During the testing the water depth was 3m and 2 trapezoidal structures 1.5m high has been fixed on each side of the tank to create a kind of canyon. The period and significant period for regular and irregular waves were 1.3 and 2.2s and the wave amplitude, 0.1, 0.2 and 0.3m. Three different configurations for the current has been used : following current (+0.20m/s), opposite current (-0.20m/s), and without current. The pressure at different water depths and the surface elevation were recorded at 32Hz at several positions. Moreover a Doppler profiler and some punctual current meters have been used to get a better representation of the main flow.

The results show the homogenisation of the vertical variation of the current by the waves especially behind the structure. Concerning the waves, the main effects are observed with opposite current, with a refraction much more important than the one due to the bathymetry only, and a significant dissipation above the structure.

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