# FUNDAMENTAL ASPECTS RELATED TO SEDIMENT TRANSPORT IN SANDY COASTS

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Marine sediment transport processes occur mainly in coastal areas, where the presence of waves and slowly varying currents is the main hydrodynamic feature. Several processes taking place at different time and space scales are involved. On the inner shelf, waves generate turbulence next to the bed largely responsible for sediment resuspension. Over the bottom boundary layer, mean currents control horizontal motion of suspended sediment while the falling of grains is compensated by the upwards diffusion resulting from the turbulent motion close to the bed[1]. Here, the total stress depends on the waves' and currents' varying contributions, whose degree of non-linearity remains unknown for the moment (Soulsby, 1993).

Due to the complexity of the governing processes, technological limitations and lack of knowledge on several aspects, mainly related to the involved physics, most of the existing models do not consider certain mechanisms as wave-related mass transport or bed roughness effects on near-bed flows. Nevertheless, to understand the fundamental aspects of sediment transport some (often non-linear) relationships involved in morphodynamic processes should not be overlooked.

Parallel and interactive development of physical and numerical experiments is a powerful tool to improve our understanding of previously investigated and new matters and to advance our ability to measure particular processes.

Experiments at full scale have been done in the Deltaflume[2] in order to improve the knowledge of sediment transport under waves. Furthermore, a smaller wave-current flume at Flanders Hydraulics is used. At this moment the flume and the various instruments are being tested and the hydrodynamics of the interaction of waves and currents are studied. In a later phase also sediments will be introduced.

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[1] Once the sediment is in suspension, moving at the same velocity as current, the falling of grains is compensated by the upwards diffusion generated for the turbulent motion of water next to the bed and related to the wave action.

[2] Transnational access to major research infrastructure: Access to experimental facilities of WL|Delft Hydraulics (Netherlands).

In addition, a set of numerical models has been selected to simulate processes taking place at several time and space scales. Vertical 1D and 2D models are used to reproduce wave-current flow close to a sandy bed and to model sediment-turbulence interaction. These detailed models are very demanding in terms of computer time. The use of 2D horizontal flow models, spectral wave and transport models, is more realistic for the study of the hydrodynamics and sediment transport in larger areas.

Spatial and temporal variations of currents, sediment distribution along the water column and bed roughness related energy dissipation, control sediment deposition, entrainment and transport at various scales. The progressive parameterisation of processes at a smaller scale for the use in models at a larger scale forms the synergy between the different models. It is seen as one of the main goals of this project.

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