

## **MATHEMATICAL MODEL FOR THE HARBOUR OF NIEUWPOORT (BELGIUM)**

Gemoets Nele<sup>1</sup>, Pieter Mathys<sup>1</sup>, Marc Huygens<sup>2</sup> and Toon Verwaest<sup>1</sup>

<sup>1</sup> Waterbouwkundig Laboratorium  
Berchemlei 115, B-2140 Antwerpen, Belgium  
E-mail: Nele.Gemoets@lin.vlaanderen.be

<sup>2</sup> Soresma nv  
Poortakkerstraat 41, B-9051 Sint Denijs Westrem

Waterbouwkundig Laboratorium in collaboration with Soresma is elaborating a new mathematical model for the harbour of Nieuwpoort (Belgium).

A lot of processes will be included in the model. Primarily, there will be the tidal action. Large amounts of water flow every ca. 13 hours in and out the harbour and this creates a large impact on the area. Secondly, there will be the influence of fresh water due to the inflow of the river "IJzer" and the inland canals which could cause density currents and stratification (related to differences in salinity and/or temperature). Thirdly, there are the processes of wave propagation and generation (by wind forcing, by vessels). And finally, there is sediment transport which is very important for the dredging works (costs) in the harbour, and also for the morphological stability of the nature reserve.

To calibrate and validate such a model you need data. Therefore Waterbouwkundig Laboratorium has set up a measuring campaign in Nieuwpoort harbour (which is executed by GEMS in collaboration with IMDC). Conductivity, temperature, water depth, turbidity and current strength were measured at different locations. Currents were also measured during two 13 hours campaigns with ADCP and drogues.

A first version of the model is already finished. It gives a qualitative view of the maximum speeds in the harbour of Nieuwpoort only taking into account tidal action and discharge from the IJzer. At the seaward locations speeds are maximum; in contrast to the harbour docks, where speeds are very low, resulting in sedimentation. When using this model one can give better advice regarding the management of the harbour area.

Acknowledgements to the afdeling Kust for supporting the financing of the research.

### References

- Lievens F. *et al.* 2005. Meetcampagne in kader van aanslibbingsproblematiek in haven en jachthaven van Nieuwpoort. GEMS in collaboration with IMDC.
- Verwaest T. *et al.* 2005. PRUP jachthaven rechteroever Nieuwpoort. Waterbouwkundig Laboratorium.
- Verwaest T. *et al.* 2005. Hydraulische modellering planscenario's PRUP jachthaven rechteroever Nieuwpoort. Waterbouwkundig Laboratorium.