HARES

SWAN

1D and 2D wave spectrum in Van Cittershaven

Validation wave conditions Van Cittershaven

The Van Cittershaven is one of the harbour basins of the Sloehaven, the industrial port east of Flushing in the Western Scheldt Estuary (The Netherlands). For the design of the primary sea defence in the Van Cittershaven wave data is needed.

The SWAN wave model has been used in the past to determine the hydraulic conditions just outside the Sloehaven. For the translation of these conditions into the Van Cittershaven a simplified pragmatic tool (excel spreadsheet) has been used. The goal of this validation study is to verify these conditions.

For this purpose a SWAN wave model has been made of the Sloehaven. The known wave conditions in front of the Sloehaven have been used as wave boundary condition for this SWAN model. The used SWAN version includes, among others, the effects of diffraction, transmission and reflection against quay walls. The results of the SWAN modelling showed higher wave conditions along the quays in the Van Cittershaven in the situation that the wave reflection was neglected, compared to the situation in which the wave reflection was set to realistic values. To further investigate this phenomenon the HARES wave model was used. HARES is a numerical wave model specially used to determine the wave energy penetration into (complex) harbour basins. The HARES wave model is based on the finite elements method and includes, among others, the effects of refraction, reflection, diffraction and directional energy spreading. The results of the HARES modelling confirmed the earlier mentioned phenomenon.

For the design of the sea defence it was recommended to use the (higher) results of the situation without wave reflection. These results (especially the peak period) are still well below the earlier found conditions by using the spreadsheet method.

Client
Rijkswaterstaat RIKZ

Location
Sloehaven Flushing, Western Scheldt, The Netherlands

Date
2005

Services
Definition of design wave by SWAN and HARES wave modelling

SVASEK HYDRAULICS
COASTAL, HARBOUR AND RIVER CONSULTANTS