

Extension of the Offshore Basis Cuxhaven: Calculation of Current Velocities in the Elbe Estuary between Großer Vogelsand and Brunsbüttel to simulate Ship Maneuvering in the Ship Simulator of the Marine Training Centre (MTC) Hamburg

Client: Niedersachsen Ports GmbH & Co. KG

Location: Cuxhafen, Germany

Scope of work: Calculation of the currents and flow velocities for mean tide and mean springtide for the inlet into the planned extension of the harbour Cuxhaven

Method: Extension of the existing hydrodynamic model, simulation of different flow conditions, transformation of simulated flow data in to MTC format

INTRODUCTION

Prior to the extension of the Offshore harbour Cuxhaven, the docking manoeuvre for a standard ship needs to be tested in a navigation simulator. The simulator requires high resolution flow velocity data for defined flow conditions of the new harbor geometry.

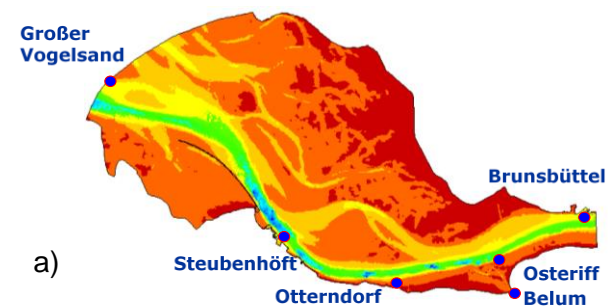


Fig. 1: Layout a) and grid b) of the model area between Brunsbüttel and Großer Vogelsand and today view of the harbor c)

METHOD

For the calculation of flow velocities during mean tide and mean springtide the following steps are necessary:

1. Adaption of the current model geometry in the planned extension area and connecting fairway
2. Simulation of the defined scenarios
3. Conversion of model results into MTC format

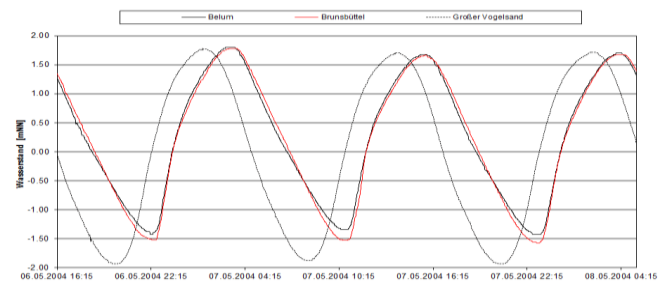


Fig. 2: Example: conditions during mean springtide as boundary conditions for the hydrodynamical model

RESULTS:

The simulation results show that for mean springtide conditions, docking manoeuvres are only possible during still water (Fig. 3).

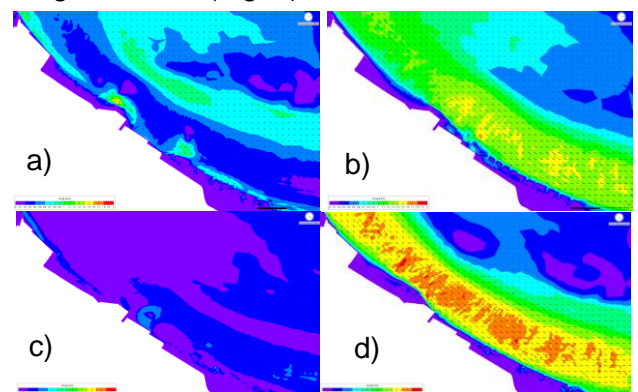


Fig. 3: Flow velocities in the area of the planned harbour extension for mean springtide during a) low tide, b) rising tide, c) high tide and d) falling tide

The restriction of passing during still water is especially relevant for ships driving upstream in the direction of Hamburg and accelerating to be fully manoeuvrable in the river bend „Altenbrucher Bogen“.