

# Documentation for Problem Instances

## Overview

This paper's instances are divided into two main categories: Shanghai Port case (located in the 'Shanghai Port' folder) and General case (located in the 'General Case' folder).

### Shanghai Port Case

These instances are generated based on the layout and operational data of Shanghai Port. For the Shanghai Port case, due to the two-way traffic rule, the width of each vessel is set as  $E_i = 1$ , and the width of each segment of the channel is set as  $W_{hs} = 2$ , thus vessel data does not include the  $E_i$  column.

### General Case

These are synthetic instances modeled on the Shanghai Port case, with an increased number of navigation channels and varied channel widths to represent more general port layouts.

## Planning Horizon Lengths

For each case, instances vary by the length of the planning horizon, ranging from 3 days (432 time units, in the '3D' folder) to 7 days (1008 time units, in the '7D' folder).

## Data Structure

Each case contains two main types of data: vessel-related data (in the 'Vessel-related' folder) and tide-related data (in the 'Tide-related' folder).

### Vessel-Related Data

Within each 'Vessel-related' folder, there are 15 files covering low, medium, and heavy traffic instances (L1-L5, M1-M5, and H1-H5, respectively). Each file includes vessel information, with columns representing vessel ID, arrival time ( $A_i$ ), expected berthing time ( $B_i$ ), service duration ( $R_i$ ), expected departure time ( $D_i$ ), departure deadline ( $\bar{D}_i$ ), and vessel width ( $E_i$ ).

### Tide-Related Data

Each 'Tide-related' folder also contains 15 files corresponding to the tide-dependent vessel tidal windows for low, medium, and heavy traffic instances. The first two columns of each file indicate the tide-dependent vessel ID and the number of tidal windows. The subsequent columns detail the specific tidal windows for each vessel.