

Subject

Vessel Motions Table Pre-Processor: User guide

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Introduction

This document provides a brief user guide to the pre-processing code supplied with this document. For the latest version, or more help, please contact TNO at windenergy@tno.nl

Date

30 March 2020

Licence

This program is supplied in executable format under the BSD-3-Clause licence, a copy of which is supplied as *LICENCE.txt* in the *exe* folder. Copyright is held by TNO.

Our reference

SPOWTT/060.33793

Input Data

The input table specifies the behaviour of a vessel in different sea states. It must be provided as a csv (comma-separated text) file, in a specific format for the pre-processor to work (this is a modified form of the Excel sheet supplied by MARIN). An example is given in the *example* folder.

The first line of the input table provides the names of the variables. Certain variable names are required (but are case insensitive):

- The vessel thrust level must be the only input column containing the word "thrust".
- The vessel thrust level must be the only output column containing the word "speed".
- The vessel drift angle must be the only output column containing the word "drift". This is optional and will be assumed to be zero if not present.
- Weather parameter names must be in the following list (but are case insensitive):
 - Wind Speed
 - Wind Direction
 - Wave Height
 - Wave Direction
 - Wave Period
 - Wind Speed at Hub Height
 - Swell Wave Direction
 - Swell Wave Period
 - Swell Wave Height
 - Tidal Height
 - Current Speed
 - Current Direction

All other (output) variables can have any (unique) name.

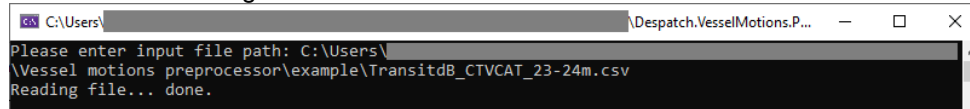
The second line of the input table specifies the units of the variables. Only the 'special' parameters specified in the list above require units. Most commonly-used units and unit abbreviations will be recognised.

The third line specifies whether a column is an input, e.g. weather, which should be indicated with IN; or an output, e.g. seasickness, which should be indicated with OUT.

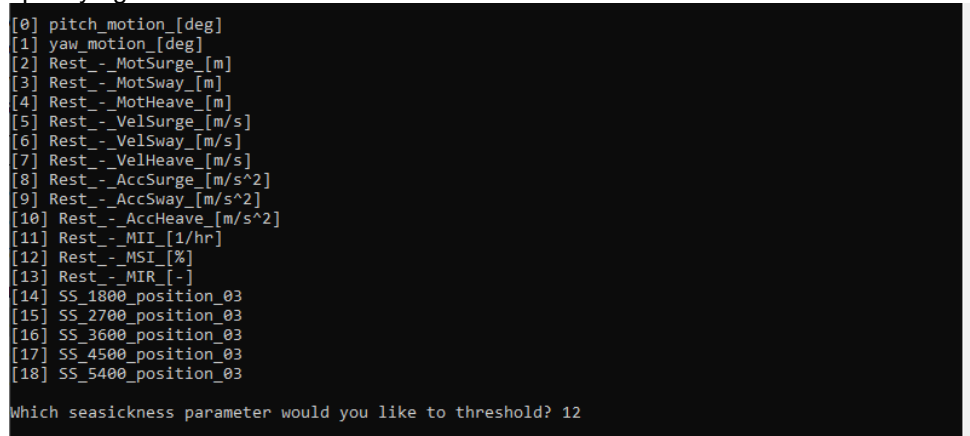
Pre-processing

The pre-processing code *Despatch.VesselMotions.PreProcessor.exe* can now be run from the *exe* folder. It only works with Windows®. This loads a console program to take the user through the process.

First it will ask for a file path, which must be typed or copy-pasted in. Once the *Enter* key is pressed, the file will be read. If no errors are encountered, the screen should look like image below:



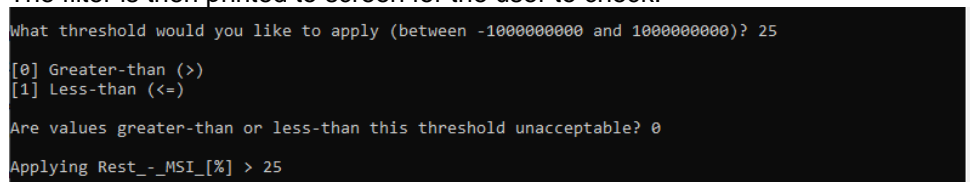
It will now ask to select one of the provided output parameters, which will form the basis of the pre-processing. In the example below, MSI has been selected, by specifying **12**.



The threshold for non-transitability is now set.

1. The threshold value must be supplied. The user needs to know a suitable value, for MSI **25%** is reasonable.
2. The user is asked to specify a threshold type. *Greater-than* means that all values greater than the threshold level of the seasickness parameter just chosen will be assumed non-transitable. Conversely, *Less-than* means that small values of the seasickness parameter are unacceptable. Large values of MSI are bad, so **0** is chosen.

The filter is then printed to screen for the user to check.



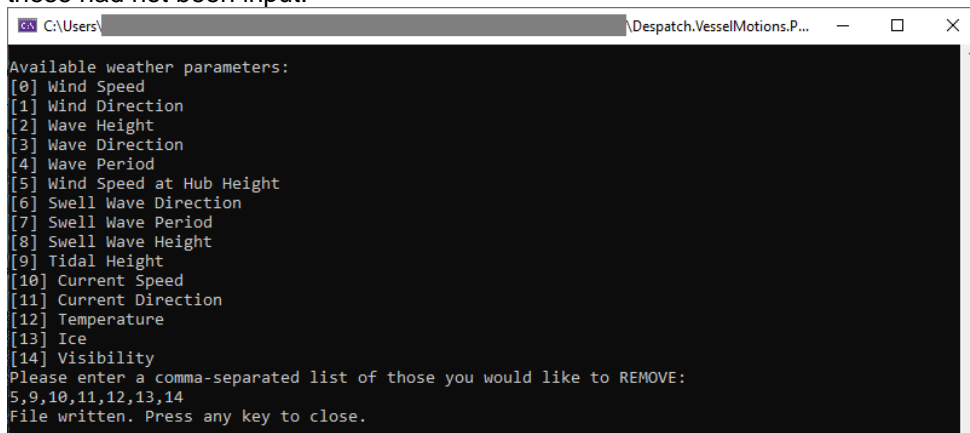
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Finally, only those weather parameters which are available in the user's weather forecast can be selected. This cuts down the database further, by choosing only one value for each of the missing weather parameters, based on internal logic. This is achieved by typing in the values for weather parameters which the user does not have: in this case **5,9,10,11,12,13,14**.

Weather parameters selected, but not in the vessel motions table, will of course also not be present in the final table. Since 5,9,12-14 were anyway not in the provided vessel motions table, there would have been no difference in the result if these had not been input.



```
C:\Users\... \Despatch.VesselMotions.P...
Available weather parameters:
[0] Wind Speed
[1] Wind Direction
[2] Wave Height
[3] Wave Direction
[4] Wave Period
[5] Wind Speed at Hub Height
[6] Swell Wave Direction
[7] Swell Wave Period
[8] Swell Wave Height
[9] Tidal Height
[10] Current Speed
[11] Current Direction
[12] Temperature
[13] Ice
[14] Visibility
Please enter a comma-separated list of those you would like to REMOVE:
5,9,10,11,12,13,14
File written. Press any key to close.
```

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Output

The pre-processing algorithm now runs, choosing for each unique set of weather parameter values the maximum acceptable vessel speed.

The pre-processed vessel speed table is written out to the same folder as the provided input file, with “_reduced” appended to the original file name, or “_reducedN” if N such files are already present.

This file can now be specified in ECN Despatch for the vessel, to activate weather-dependent vessel speed (and thus also more accurate transitability).