

SpecGen User Manual

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Table of Contents

1. Introduction.....	3
2. Installation	3
3. Start-up.....	3
4. Extracting Output.....	4
5. Script-Tree.....	5

1. Introduction

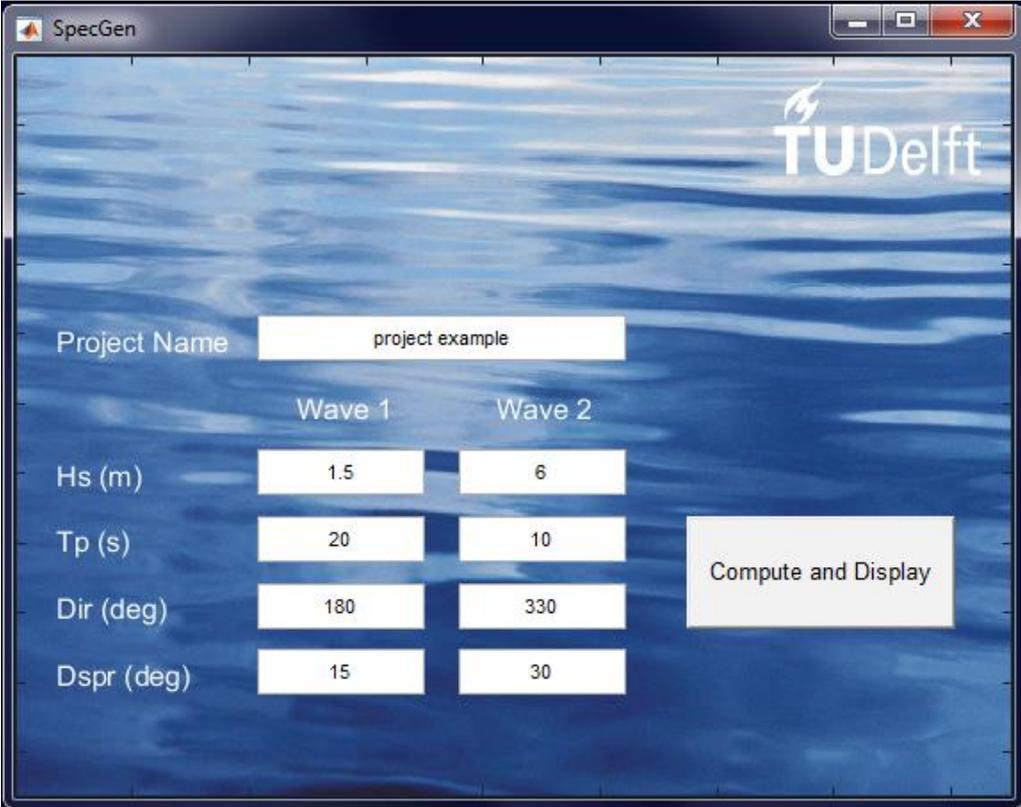
This document discusses the 1-D and 2-D spectrum generator, which goes by the name SpecGen. It has been developed to create a spectra for a maximum of two design waves. These are visualised in plots and saved in two SWAN-files. These SWAN-files can be used as input for SwanOne (and SWAN) computations. The following sections provide an explanation of the implementation and contents of the spectrum generator.

2. Installation

The generator can be executed by either a standalone or a Matlab version. For the standalone (EXE-file), one should first install the MCR installer. After a double click on the executable, **wait for 60 seconds**. Matlab can also be applied by including the m-files. One should run SpecGen.m in Matlab R2015b.

3. Start-up

To compute a spectrum, the characteristics of one or two waves are required. These consist of the significant wave height, H_s (m), peak wave period, T_p (s), wave direction, Dir (deg), and wave spreading, $Dspr$ (deg). In addition, the wave direction is 0 degrees on the axis in eastern direction and increases counter clockwise. The considered values can be submitted to the generator as shown in the Figure 1.



	Wave 1	Wave 2
Project Name	project example	
H_s (m)	1.5	6
T_p (s)	20	10
Dir (deg)	180	330
$Dspr$ (deg)	15	30

Compute and Display

Figure 1 SpecGen Start-up and Computation Window

When there is only one design wave, one should fill the edit-boxes of either 'Wave 1' or 'Wave 2', and leave one of them in all fields empty. Subsequently, the generator can be executed by pressing 'Compute and Display'.

The 'Project Name' will be subscribed to the SWAN-files. These files will be overwritten if the name does not change. So, change the name in case of multiple case studies.

4. Extracting Output

The output of the model is two spectra plots and related SP-files. The spectra in the Figure 2 are instantly shown when the model is runned. On the left, the 1-D spectrum is plotted, which shows the integration of wave energy of all wave directions. As a result of the two design waves, there is a high probability of two peaks in the spectrum. On the right, the 2-D spectrum presents the wave energy distributed over the wave directions. The circles represent the wave frequency from 0 Hz (midpoint) to 0.5 Hz (outer-ring). These typical frequencies concern waves, which are relevant for the design of hydraulic structures. Moreover, in the same plot straight lines are drawn, which refer to the various wave directions. These change with steps of 30 degrees counter clockwise. The third variable is the wave energy, which is indicated with colours. The dark colour tint means a high wave energy, while the white colour implies insignificant wave action.

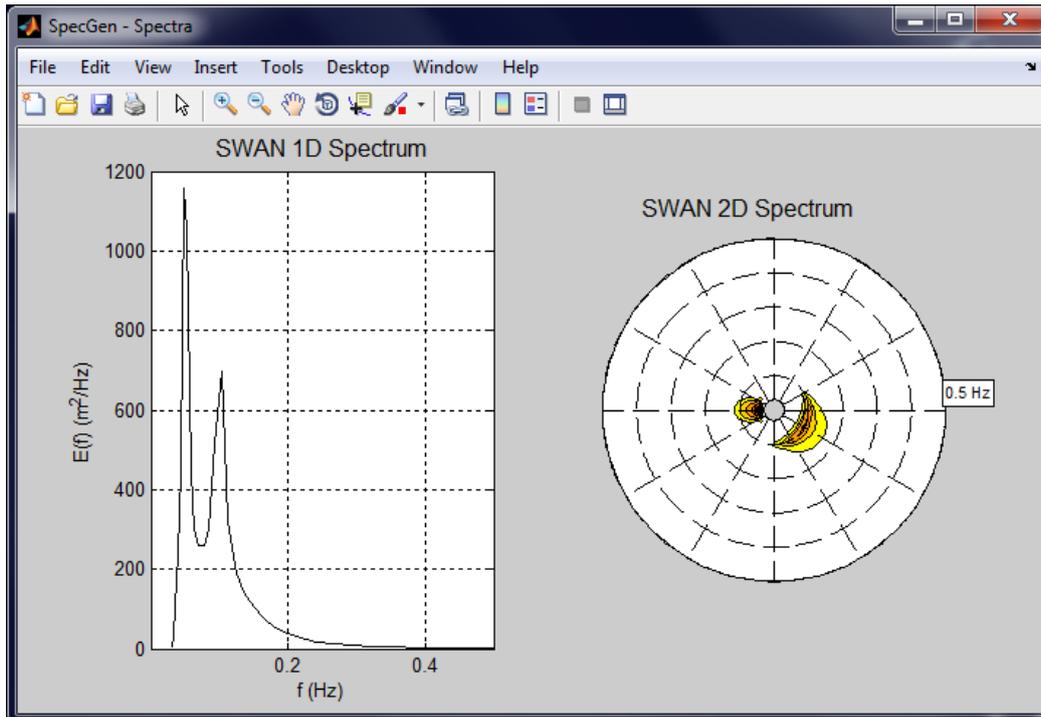


Figure 2 Spectrum Plots

The 1-D and 2-D wave data are saved in SWAN-files with the extension SP1 and SP2 in the working directory. In the example below the Matlab-files can be recognised which are the two 'project example' files.

comcolor	30-5-2002 1:31	MATLAB Code	1 KB
compute_spec	23-10-2015 13:32	MATLAB Code	2 KB
create_swanspectra	11-11-2015 12:56	MATLAB Code	8 KB
fcontour	13-10-2015 7:44	MATLAB Code	5 KB
fjonswap	13-10-2015 7:44	MATLAB Code	2 KB
flines	13-10-2015 7:44	MATLAB Code	2 KB
gamma_ratio	13-10-2015 12:29	MATLAB Code	2 KB
isopol3	24-11-2015 14:10	MATLAB Code	6 KB
project example	11-12-2015 14:05	SP1 File	2 KB
project example	11-12-2015 14:05	SP2 File	14 KB
rgbfov	30-1-1997 10:26	MATLAB Code	2 KB
sea_surface	23-10-2015 16:28	JPEG image	269 KB
SpecGen	11-11-2015 13:18	MATLAB Code	4 KB
write_swan_sp1	13-10-2015 7:44	MATLAB Code	5 KB
write_swan_sp2	13-10-2015 13:09	MATLAB Code	4 KB
z_steps	28-9-2009 21:50	MATLAB Code	1 KB

5. Script-Tree

The relation between the various Matlab-scripts is presented in Table 1. The script tree begins with *SpecGen.m* at Level I. From this level, the underlying scripts (Level I to Level VI) can be activated. For example, *isopol3.m* controls or requires the function files: *comcolor.m*, *fcontour.m* and *flines.m*. Thus, one should read the table from left to right.

Level I	Level II	Level III	Level IV	Level V	Level VI
<i>SpecGen.m</i>	<i>compute_spec.m</i>	<i>create_swan_spectra.m</i>	<i>gamma_ratio.m</i>		
			<i>fjonswap.m</i>		
			<i>write_swan_sp1.m</i>		
			<i>write_swan_sp2.m</i>		
			<i>isopol3.m</i>	<i>comcolor.m</i>	
				<i>fcontour.m</i>	<i>comcolor.m</i>
					<i>rgbofv.m</i>
<i>z-steps.m</i>					

Table 1 SpecGen Script Tree