Wave field generation

For the generation of the undisturbed wave field the following time traces are retrieved from the aNySim res-file:

- Wave height at earth-fixed wave origin
- Earth-fixed wave direction
- Swell height at earth-fixed swell origin
- Earth-fixed swell direction
- Earth-fixed X- and Y-position and heading of the ship

During the visualization of the wave field the wave heights and normals at the grid vertices are pre-calculated for a short period of the simulation: i.e. a window length. This is done to avoid storage of large amounts of data.

The window comprises Nwindow samples where Nwindow is a power of 2 for an efficient calculation of the FFT. The default time step of the windows equals the time step of the res-file. When a given time step for the visualization differs from the time step in the res-file the time traces are resampled to this time step. Recommended values for visualization time step and window length are 0.2 s and 256 samples, resulting in a window length of 51.2 s

It is known that due to the FFT the first and last part of a window contain data which cannot be used. Therefore, a certain overlap of two successive windows will not be used. The number of samples in this overlap is given by the user. So the part of a window which is actually applied in the visualization amounts to Nwindow – 2 * Noverlap samples.

The following figure shows at which moments the wave heights are calculated, the dotted line segments indicate which part of the windows is not used (overlap):
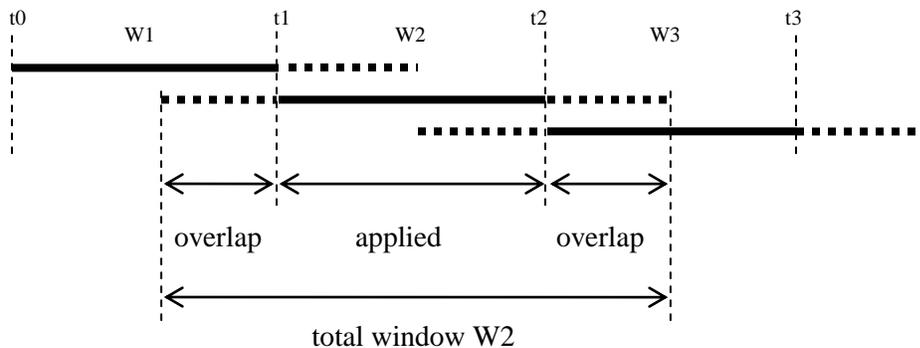
Time = t0:   window W1 is calculated
Time = t1:   window W2 is calculated
Time = t2:   window W3 is calculated
Time = t3:   window W4 is calculated
Etc.