Errata of November 2019 to **EurOtop 2018**

Page 107. Equation 5.2 should read:

with a maximum of

$$\frac{R_{u2\%}}{H_{m0}} = 1.0 \cdot \gamma_f \cdot \gamma_\beta (4.0 - \frac{1.5}{\sqrt{\gamma_b \cdot \xi_{m-1,0}}}) \quad 5.2$$

Page 109, Equation 5.5 should read:

with a maximum of

$$\frac{R_{u2\%}}{H_{m0}} = 1.07 \cdot \gamma_f \cdot \gamma_\beta (4.3 - \frac{1.5}{\sqrt{\gamma_b \cdot \xi_{m-1,0}}}) \quad 5.5$$

Pages 142 and 143 should be replaced by the pages 142 and 143 in this errata. The text in red as well as Figures 5.45 and 5.46 have been modified.

Page 178. Last line before Equation 6.9 should read: …increasing angle (compare with Equation 5.29):

Wave wall on top of emerged slope or promenade (non-breaking waves on the slope)

The main improvement, however, in this manual is based on Van Doorslaer *et al.* (2015) and relates to a straight smooth seaward slope of 1:2 or 1:3 with a wave wall or storm wall on top of the slope or somewhere on a promenade, with or without bullnose. In all conditions the waves were not breaking on the slope. In order to give an overall view and an impression of the possible effects of storm walls and a bullnose, Figure 5.45 and Figure 5.46 were produced. The first figure gives all test results with the trend line for a smooth straight 1:2 or 1:3 slope as reference. Equation 5.11 in Section 5.3.1 is the average curve for overtopping, but Van Doorslaer found a little larger overtopping for a smooth slope, represented by Equation 5.44. A reason for this difference has not been established.

Figure 5.45 shows that a smooth slope gave always the largest wave overtopping and that any measure, such as a promenade, a storm wall, with or without a bullnose, reduces wave overtopping. The smallest influences are found for extending the top of the slope with a promenade only (no storm wall) and with a storm wall directly on the slope, without promenade or bullnose. Those data points are closest to the trend line for a smooth slope ~~and mostly within the 90% confidence band~~. Most effective are a wall with bullnose on a slope or a wall with or without bullnose on a promenade. Those data points give often overtopping that is a factor of 10-100 smaller than for a smooth straight slope, with the same crest level.

If all the reduction factors have been applied that have been described further on in this section, it gives Figure 5.46. The test results have been analysed into great detail, leading to a graph with limited scatter around ~~the~~Van Doorslaer's fit for a smooth slope. Actually, the scatter for these specific tests is significantly smaller than for the overall Equation 5.11, which is given in the graph by the 5% exceedance lines. Note that the graphs are for non-breaking waves only, as the tested seaward slopes of 1:2 and 1:3 always gave non-breaking waves and the *actual slope* was used to calculate the breaker parameter, $\xi_{m-1,0}$.

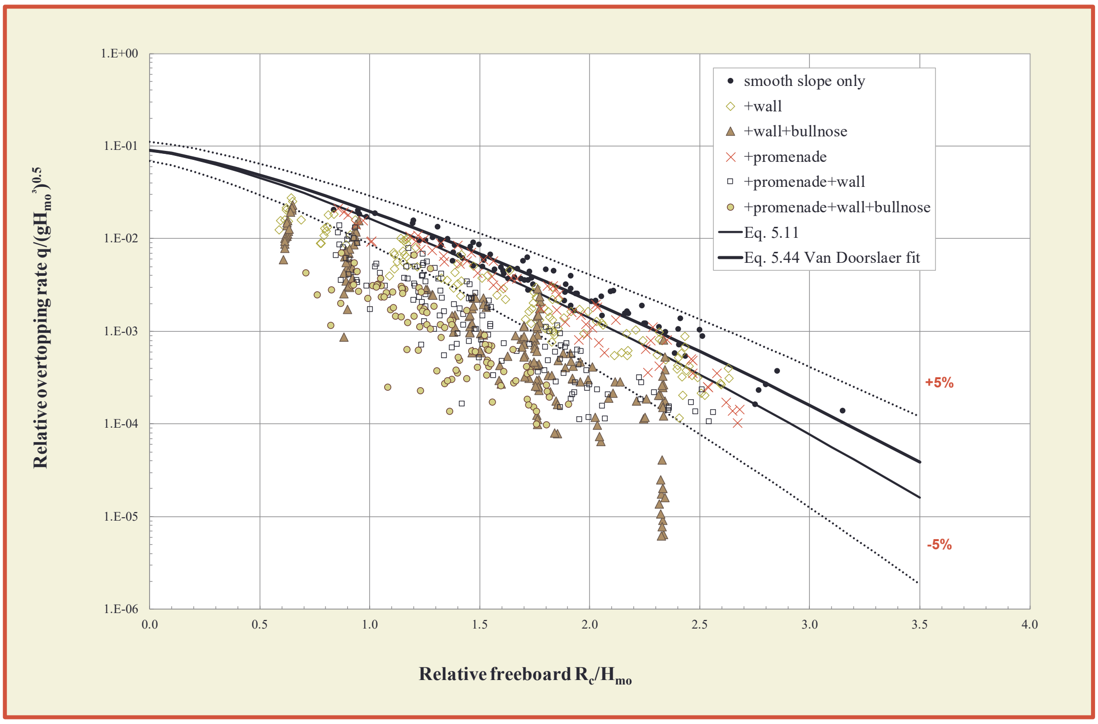

Figure 5.1. All test results of Van Doorslaer *et al.* (2015) on wave walls with or without bullnose, without applying all reduction factors as described in this section

The range of application of a storm wall on a slope or promenade can be given as follows:

- the foot of the storm wall is above swl
- cot α = 2 - 3 (this could also be an average slope, but without the wall)
- $s_{m-1,0}$ = 0.01 – 0.05
- $\xi_{m-1,0}$ = 2.2 – 4.8 (based on the seaward slope only, this means ***non-breaking waves***)
- R_c/H_{m0} > 0.6
- Promenade slope 1% and 2%

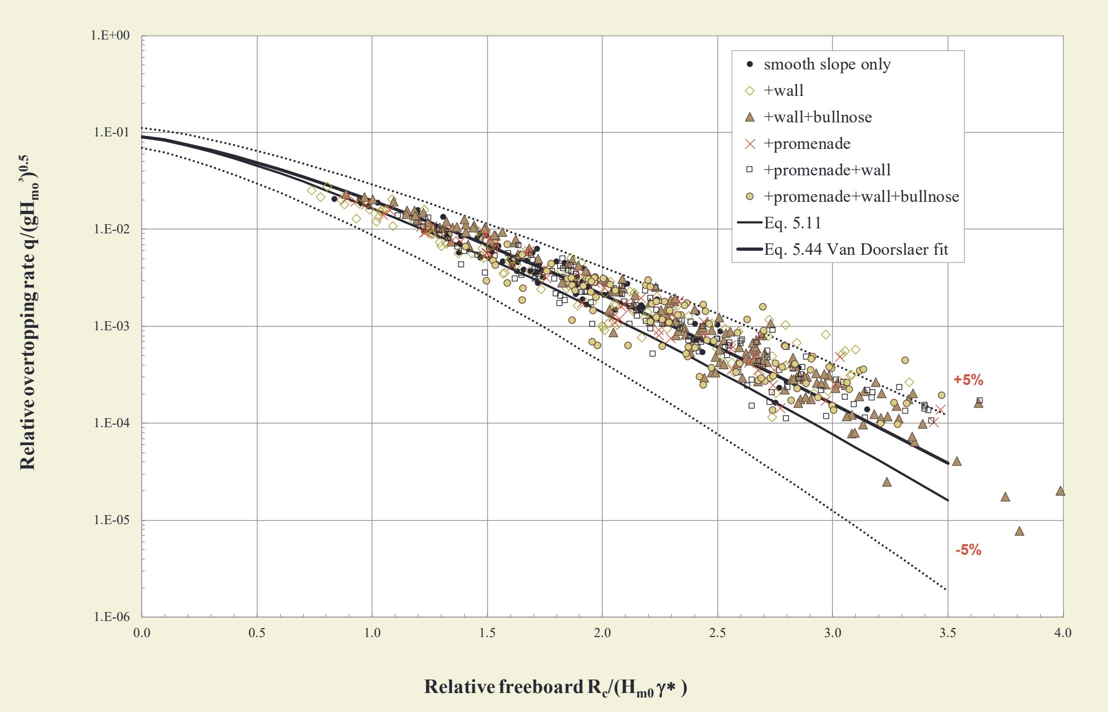

Figure 5.2: All test results of Van Doorslaer *et al.* (2015) on wave walls with or without bullnose, applying all reduction factors as described in this section

Influence factors or reduction coefficients are proposed for different geometrical configurations at the top of a smooth sloping dike. Such configurations can be summarized as follows:

a) smooth dike slope + storm wall;
b) smooth dike slope + storm wall and bullnose;
c) smooth dike slope + promenade;
d) smooth dike slope + promenade + storm wall;
e) smooth dike slope + promenade + storm wall and bullnose;

The influence factors are to be included in the denominator of the exponential part of the general formula for non-breaking waves. This would be Equation 5.11 for general application and Equation 5.44 in case Van Doorslaer's fit for a smooth slope is taken as reference.

$$\frac{q}{\sqrt{gH_{m0}^3}} = 0.09 \cdot exp\left(-\left[1.38\frac{R_c}{H_{m0}\gamma^*}\right]^{1.3}\right) \qquad 5.44$$

where γ^* is the combined influence factor that will be detailed for each configuration a) to e) above. No roughness, obliqueness or presence of a berm was used throughout the model tests. This means that $\gamma_f = \gamma_\beta = \gamma_b = 1$, but these influence factors could be applied in practice, assuming that they are also valid when a wave wall is present.

a) Smooth dike slope + storm wall ($\gamma^* = \gamma_v$)

The case of a smooth dike with a storm wall, Figure 5.47, corresponds to the situation where a vertical wall (with height h_{wall}) is built on the top of the slope of the dike. The height of this storm wall is included in the definition of the crest freeboard R_c ($R_c = A_c + h_{wall}$). The influence factor $\gamma^* = \gamma_v$ is defined as follows:

$$\gamma_v = exp\left(-0.56\frac{h_{wall}}{R_c}\right) \qquad 5.45$$