JOURNAL OF COASTAL AND HYDRAULIC STRUCTURES

Review and rebuttal of the paper

Rock Armour Slope Stability under Wave Attack; the Van der Meer Formula revisited

Jentsje W. van der Meer

Editor handling the paper: Nils Goseberg

Reviewer A:

The manuscript provides an extensive review of the Van der Meer formula and how to modify and extend the formula according to new experimental data or new applications in a consistent way. The manuscript will be very helpful to practitioners as well as researchers in the area of coastal engineers, hence it deserves to be published in the JCHS.

On the other hand, there are sentences and phrases that are rather difficult to comprehend, and a professional English editing may help improve presentation of the fine results of the manuscript. In hoping to help authors, a list of suggestions are as below:

(1) 2nd paragraph of Abstract: A guideline how to --> A guideline on how to
(2) 3rd paragraph of Abstract: best described if using --> best described by using
(3) in the same sentence as in (2): the original formula by the --> the original formula with
(4) 4th sentence of Abstract: a significant thinner --> a significantly thinner
(5) near the end of Abstract: a safety coefficient --> a safety factor
(6) line 38, page 2: Rock Manual (2007), Van der Meer --> Rock Manual (2007) and Van der Meer
(7) line 91, page 3: The essence of ... --> In this paper, the essence of ...
(8) lines 104-106 and lines 107-109 are essentially a repeat. Maybe those could merge into one paragraph.
(9) line 211, page 7: it means that the for a graph --> it means that
(10) line 219, page 7: a more gentle slope --> a milder slope
(11) line 232-233, page 7: This means that for impermable structures --> This means that, e. g., stability for impermeable structures
(12) line 249, page 8: Eqs. 6 and 7 are valid and that means that --> That eqs. 6 and 7 are valid means that
(13) line 270, page 9: with a part for plunging and a part for surging --> with a part for plunging and another part for surging
(14) line 271, page 9: many slope angles, ... --> wide ranges of slope angles, ...
(15) lines 272-274, page 9: The sentence mentions plunging and surging waves in a very confusing way, and I couldn't comprehend what you mean. Please rephrase the sentence.
(16) line 381, page 12: The beginning of the sentence may be rewritten as 'These stone shapes show stability less than or sometimes equal to ...'
(17) lines 412-414, page 13: The sentence is difficult to understand. It may be

rephrased as '... caused by the fact that stones much smaller than D_n50 are present in the wide grading.'
(18) line 423, page 13: much smaller stones than --> stones much smallller than
(19) line 630, page 19: The wo data points --> The two data points

Recommendation: Accept Submission

Reviewer B:

The paper gives a comprehensive insight into the applicability of the Van der Meer formula. Limits to the comparability of results of further studies with this formula are discussed. This applicability and non-applicability of the formula for several parameters is clearly demonstrated using the data from further hydraulic model studies. The authors provide new insights with respect to the application of the spectral wave period to the Van der Meer formula and demonstrate modifications of the initial formula to consider rock placing and rock shape in the damage assessment.

The review of the Van der Meer formula was carried out with careful attention to detail. The argumentation chains are coherent and confirm a comprehensive understanding of the authors for the discussed topic. Particularly noteworthy here is the knowledge and documentation of specific boundary conditions of various hydraulic model studies and the significance of these differences for the stability of revetments. The authors conduct this discussion clearly and stringently.

The reviewer very much appreciates that interrelationships and basic principles are explained in detail (e.g., the description of the selection of test constraints for neural networks in line 294ff.). This is the right style for a guideline paper. Furthermore, effects and observations are clearly explained by physical relationships. This supports the reader in building an understanding of the issues discussed.

Following editorial and content comments are suggested by the reviewer:

Line	Comment
52	Even though the coefficients 6.2 and 1.0 in the Van der Meer formula are well known in the literature, the coefficients could be replaced by symbols (e.g. a, b) also in formula (1) and (2) to ensure a clear assignment of both.

97 The authors could add “… has not been considered *to date*, as it is …” to be more precise. The reviewer first misunderstood that the work was not covered in this paper either and was then misled by the starting discussion in Line 100.

122 If data points from a graph have been digitized the authors should add a comment on method, reading quality/accuracy and possible deviations from the original value. If only data of a printed table was used the procedure "digitize these spectra" is misleading.

137 ξm-1,0 is introduced in Eq. (4) the first time. This definition should be given in line 132.

151ff. The authors describe the influence of different wave periods on the application of the Van der Meer formula for narrow and wide spectra. The fit is described with subjective interpretations (“fairly well”, ”minor deviations”). It could be helpful for this important comparison to provide deviation numbers from a best fit and underline the applicability of the different approaches. Based on an optical fit, the reviewer favors the common use of Tm, although the advantages of Tm-1,0 are seen and the discussion is valuable.

181 For clarity, exponent 5 should be given as a symbol (e.g. a) as it is referred several times (e.g. line 187 to 194) with different values.

211 One word too much?: “… it means that the for a graph the stability…”

221 The transition to Figure 5 is very hard. A further explanatory sentence would round off the reading flow.

235 The experienced reader knows the vague boundaries of plunging and surging waves. A visual separation of the areas (e.g. by dashed lines) in figure 4 to 7 would be more helpful than the pure textual information in the figure.

241 “reconstructed” would be more stringent than “constructed”

252 It is convenient that www.vdm-c.nl provides the images and datasets. Are these datasets also available in public permanent repository e.g. with DOI? This would be a more secure source in the long run, as there are always limits to the maintenance of private homepages.

264 “i.e.” instead of “ie”

265 check for consistence: under layer vs. underlayer (e.g. line 263)

282 The authors justifiably point out that the coefficients 6.1 and 1.0 come along with standard deviations. Corresponding lines could be added to figure 7 as an example to support the meaning graphically.

289 “In principle …” instead of “In principal …”

306 Please specify “They” by references.

410 “(only published before in Dutch…” is an interesting information for the editor but not relevant for the present paper. A plain reference to the report is sufficient.

428 Focus of the discussion is the difference between uniform and wide grading. Hence, the legend of the right figure should include “wide” as information e.g. “wide (riprap)”

529 The given values for cpl and csu differ from the legend in Figure 14.

630 “two” instead of “wo”

Recommendation: Revisions Required

Reply to reviewers

First of all I would like to thank both reviewers for their very positive comments on the overall paper.

Reply to reviewer A

This reviewer does not have comments on contents, but would like to have the English improved. A list of suggestions was given. All these suggestions have been accepted in the present version of the paper and have therefore not been repeated here. Moreover, not being a native English speaker, it is impossible for me to improve more myself. Therefore I have asked one of my Scottish colleagues to help with the English editing and he did a great job. The present version in track changes with red gives all the improvements on language. The changes in blue and green were made by myself.

Reply to reviewer B

The comments of the reviewer have been copied here and the action is given below each comment.

52 Even though the coefficients 6.2 and 1.0 in the Van der Meer formula are well known in theliterature, the coefficients could be replaced by symbols (e.g. a, b) also in formula (1) and (2) to ensure a clear assignment of both.

This would indeed be possible and was also done in the Rock Manual. But this paper gives only the original Van der Meer formula with the two coefficients and two related modified formulae (on the use of H2% and on Tm-1,0) also each with their own coefficients. There are no formulae with other coefficients in the paper. Instead modifications to each of these formulae are described with the cpl and csu-values in Eqs. 9-16, including the original coefficients. The comment is logical if one reads the first page of the paper, but from the whole paper it becomes clear that the actual coefficients were used on purpose.

97 The authors could add "… has not been considered to date, as it is …" to be more precise. The reviewer first misunderstood that the work was not covered in this paper either and was then misled by the starting discussion in Line 100.

Has been accepted and changed.

122 If data points from a graph have been digitized the authors should add a comment on method, reading quality/accuracy and possible deviations from the original value. If only data of a printed table was used the procedure "digitize these spectra" is misleading.

Graphs were digitised. This is now noted and that small deviations may have occurred.

137 ξm-1,0 is introduced in Eq. (4) the first time. This definition should be given in line 132.

Accepted.

151ff. The authors describe the influence of different wave periods on the application of the Van der Meer formula for narrow and wide spectra. The fit is described with subjective interpretations ("fairly well", "minor deviations"). It could be helpful for this important comparison to provide deviation numbers from a best fit and underline the applicability of the different approaches. Based on an optical fit, the reviewer favors the common use of Tm, although the advantages of Tm-1,0 are seen and the discussion is valuable.

Scientifically speaking the reviewer is correct. The problem is that curve fitting (and showing the new equations) does not really make the paper more clear, as equations will appear that are quite different from the Van der Meer formula, and that may also confuse the readers.Now the optical differences are described (ranges where there are differences) and in this case that is preferred over indexes of best fits. It is also for this reason that all three graphs are given. Note that the data have been used in Figure 12 to describe the influence of rounded stones.

181 For clarity, exponent 5 should be given as a symbol (e.g. a) as it is referred several times (e.g. line 187 to 194) with different values.

Accepted.

211 One word too much?: "… it means that the for a graph the stability…"

Yes, accepted.

221 The transition to Figure 5 is very hard. A further explanatory sentence would round off the reading flow.

Has been changed.

235 The experienced reader knows the vague boundaries of plunging and surging waves. A visual separation of the areas (e.g. by dashed lines) in figure 4 to 7 would be more helpful than the pure textual information in the figure.

Arrows have been included now in each figure.

241 “reconstructed” would be more stringent than “constructed”

Accepted.

252 It is convenient that www.vdm-c.nl provides the images and datasets. Are these datasets also available in public permanent repository e.g. with DOI? This would be a more secure source in the long run, as there are always limits to the maintenance of private homepages.

A DOI has been achieved at Zenodo.

264 “i.e.” instead of “ie”

Accepted.

265 check for consistence: under layer vs. underlayer (e.g. line 263)

Accepted.

282 The authors justifiably point out that the coefficients 6.1 and 1.0 come along with standard deviations. Corresponding lines could be added to figure 7 as an example to support the meaning graphically.

Good remark. 5% exceedance lines, giving the 90%-confidence band, have been given in Fig. 7.

289 “In principle …” instead of “In principal …”

Accepted.

306 Please specify “They” by references.

References given.

410 “(only published before in Dutch…” is an interesting information for the editor but not relevant for the present paper. A plain reference to the report is sufficient.

Accepted.

428 Focus of the discussion is the difference between uniform and wide grading. Hence, the legend of the right figure should include “wide” as information e.g. “wide (riprap)”

Accepted.

529 The given values for cpl and csu differ from the legend in Figure 14.

Has been made consistent.

630 “two” instead of “wo”

Accepted.
