
JOURNAL OF COASTAL AND HYDRAULIC STRUCTURES

Review and rebuttal of the paper

Bubble Image Velocimetry technique applied to wave overtopping flow characterization - challenges and opportunities

Altomare et al.

Editor handling the paper: Miguel Esteban

The reviewers remain anonymous.

Here, the original comments by the reviewer are in black, and the responses by the authors are in blue. We have also included the newest relevant text added in the manuscript using *italics*.

ROUND 1

Reviewer A

General comments

This paper is useful to hydraulic modellers concerned with wave overtopping.

We would like to express my gratitude for your kind words.

It provides some insights and solutions to measuring overtopping flows in physical models, although it does NOT per se provide any usable overtopping data. You should therefore avoid any claims of practical utility outside of your target audience.

The reviewer is not convinced that all of the references are required.

We would like to express our gratitude to the Reviewer A for their meticulous revision. We have addressed all comments hereafter.

Detailed comments

P1, line 13-14 ... The objective of the experimental campaign was to develop methods to enhance ...

Corrected.

P1, line 29 velocities

Corrected.

P2, line 1 Replace 'accurate' by 'robust'.

Corrected.

P2, line 2 ... focusses on methods to characterise the flow ...

Corrected.

P2, line 3 Delete duplicate 'using'

Corrected.

P2, line 10 Delete 'on of'

Corrected.

P2, line 24 formulae

P2, line 27 Raby *et al* did NOT examine 'overtopping' processes per se. They concentrated on wave impacting. I suggest you delete this sentence, or replace 'overtopping' by 'wave impact'

Corrected.

P2, lines 34-36 Stein & Siegle did NOT analyse OVERTOPPING events per se, simply conditions for which overtopping had been noted. This reference is therefore somewhat specious in the context of this paper.

I suggest that you delete it.

Removed.

P2, line 41 Delete ‘therefore’, as your general comment does not follow from the references cited immediately above.

Corrected.

P3, line 2-3 ... can probably give better estimates of flow velocities in aerated flows.

Corrected.

P3, line 16 You have not told the reader anything about ‘the deck’. Please explain more carefully.

The type of structure has been specified.

P3, line 19 What is ‘hammer fist’, indeed what are the other types of flow events? Please explain and/or re-phrase.

Reference to the work of Greco et al. (2007) is made, where these kind of events have been identified.

P3, lines 36-37 The Discussions and Conclusions in Section 5 consider the ...

Corrected.

P4, line 4 ... results. A nominally 1:50 scale ...

Corrected.

P4, line 16 ... the distance from the wave generator (centre stroke at rest) ranged ...

Corrected.

P4, line 27 Ugly, unclear, and over-long sentence. They showed that the experimental method was useful in studying WSI problems, but they didn’t provide engineering solutions. Please rephrase.

The sentence has been rephrased.

P6, line 2 ... on the four sea dike slopes studied here.

Corrected.

P9, line 40 $T_p = 1.6s$,

Corrected.

P10, line 14 ... which at 1:50 scale might correspond ...

Corrected.

P17, line 5 and 12 formulae

Corrected.

P18, line 2 The significance of 5.2m/s is entirely obscure. Please explain.

The sentence has been rephrased as following:

Measured velocities, scaled to prototype conditions, remain within the same order of magnitude, with the maximum value not exceeding 5.2 m/s.

The value of 5.2 m/s corresponds to the highest velocity measured and scaled to prototype conditions, falling within the expected range of 2–8 m/s predicted by empirical formulations.

P18, line 41-42 This sentence is unhelpful. All uncertainties influence the calculation results! Please delete unless you can impart something useful to the reader on the influence of input uncertainties.

Removed.

P19, lines 32-33 You have not provided any evidence on understanding overtopping dynamics, so I suggest you delete this sentence.

Removed.

P19, line 33 Delete 'primary'.

Removed.

P19, line 38 to 39 Delete this sentence.

Removed.

P20, line 44 ... the application of BIV can be useful in providing ...

Corrected

P21, line 7 Please provide details of funding support.

This will be provided in the published version. During the review process, funding are not mentioned to guarantee a double-blind review.

P22, line 1 Define (show equation for) Re.

Definition has been provided

P22, line 12 Define (show equation for) We.

Definition has been provided

P23 I assume that the publisher will put References into their chosen order.

This will be during the final editing

P24, line 33-34 Whilst interesting, I do not believe that this paper is relevant to the current paper.

We respectfully submit that our position differs from the Reviewer's one. We would like to suggest that it is kept, since it employed focused wave groups for wave overtopping, which we do consider relevant.

Reviewer B

I appreciate the extent and detail of the work that the authors have committed to their revisions.

The title is such an important aspect of any paper. Thank you for the adjusted version (my item 1). Thank you too for the improvements to the literature review (my item 4).

We would like to express our gratitude to the Reviewer B for their meticulous revision. We have addressed all comments hereafter.

On my item 2, re the underpinning PIV/BIV assumptions: thank you for the helpful commentaries in your response to me. You mention that "for brevity", these are not added to the manuscript itself. I'd push back

gently on this – if these even informal cross-checks are useful to me (which they are), I think that they are also useful to the readership.

Further considerations, based on Reviewer's previous comments have been added to manuscript, as follows:

Page 8, Lines 5-11

The velocity field in each interrogation cell is assumed to be uniform. Prior to analysing the full set of frames and generating results, the interrogation cell was carefully selected using an automatic algorithm in PIVlab, which proposes settings based on the image data in the chosen frame. While the evolving nature of the flow along the dike could lead to performance variations between frames, a random check confirmed that the selected settings produced consistent and expected results.

Page 8, Lines 15-16

The temporal evolution of the flow was considered constant over the timescale between image acquisitions. Visual observations indicate no significant changes in the timescale of the phenomenon, at least within the selected frames.

On my item 3, re the focussed wave, and re reproducibility – my apologies for missing the link to the publicly accessible Data Storage Plan. On the waves themselves, although I am not fully convinced of the utility of focussed wave groups in contributing to design guidance on overtopping, the overall rationale of exploring and appraising the BIV methodology in this setting is now clearer, which in turn supports the choice of waves here.

Thank you for your comment and appreciation.

My item 5 was on 'closing the loop' through quantitative comparisons with literature. The response here is less strong, but the additional acknowledgement of the desirability of this in 'further work' is helpful.

Thanks a lot for your consideration.

Overall, then, although the increment of knowledge and understanding remains rather limited, the manuscript now 'holds together' quite significantly better in terms of a clear and consistent narrative than the first version. As such, if the Editor is content with the current end point vs further work, I think that the manuscript can be progressed to publication, ideally with the very minor revision suggested above, under my "Item 2" commentary.

Thanks to the author for their interesting work, and to the Editor for allowing me to carry out this review which seems to have been useful.

ROUND 2

Reviewer A

General comments

This paper is useful to hydraulic modellers concerned with wave overtopping.

[We would like to express my gratitude for your kind words.](#)

It provides some insights and solutions to measuring overtopping flows in physical models, although it does NOT per se provide any usable overtopping data. You should therefore avoid any claims of practical utility outside of your target audience.

The reviewer is not convinced that all of the references are required.

[We would like to express our gratitude to the Reviewer A for their meticulous revision. We have addressed all comments hereafter.](#)

Detailed comments

P1, line 13-14 ... The objective of the experimental campaign was to develop methods to enhance ...

[Corrected.](#)

P1, line 29 velocities

[Corrected.](#)

P2, line 1 Replace 'accurate' by 'robust'.

[Corrected.](#)

P2, line 2 ... focusses on methods to characterise the flow ...

[Corrected.](#)

P2, line 3 Delete duplicate 'using'

[Corrected.](#)

P2, line 10 Delete 'on of'

[Corrected.](#)

P2, line 24 formulae

P2, line 27 Raby *et al* did NOT examine 'overtopping' processes per se. They concentrated on wave impacting. I suggest you delete this sentence, or replace 'overtopping' by 'wave impact' ...

[Corrected.](#)

P2, lines 34-36 Stein & Siegle did NOT analyse OVERTOPPING events per se, simply conditions for which overtopping had been noted. This reference is therefore somewhat specious in the context of this paper. I suggest that you delete it.

[Removed.](#)

P2, line 41 Delete ‘therefore’, as your general comment does not follow from the references cited immediately above.

Corrected.

P3, line 2-3 ... can probably give better estimates of flow velocities in aerated flows.

Corrected.

P3, line 16 You have not told the reader anything about ‘the deck’. Please explain more carefully.

The type of structure has been specified.

P3, line 19 What is ‘hammer fist’, indeed what are the other types of flow events? Please explain and/or re-phrase.

Reference to the work of Greco et al. (2007) is made, where these kind of events have been identified.

P3, lines 36-37 The Discussions and Conclusions in Section 5 consider the ...

Corrected.

P4, line 4 ... results. A nominally 1:50 scale ...

Corrected.

P4, line 16 ... the distance from the wave generator (centre stroke at rest) ranged ...

Corrected.

P4, line 27 Ugly, unclear, and over-long sentence. They showed that the experimental method was useful in studying WSI problems, but they didn’t provide engineering solutions. Please rephrase.

The sentence has been rephrased.

P6, line 2 ... on the four sea dike slopes studied here.

Corrected.

P9, line 40 $T_p = 1.6s$,

Corrected.

P10, line 14 ... which at 1:50 scale might correspond ...

Corrected.

P17, line 5 and 12 formulae

Corrected.

P18, line 2 The significance of 5.2m/s is entirely obscure. Please explain.

The sentence has been rephrased as following:

Measured velocities, scaled to prototype conditions, remain within the same order of magnitude, with the maximum value not exceeding 5.2 m/s.

The value of 5.2 m/s corresponds to the highest velocity measured and scaled to prototype conditions, falling within the expected range of 2–8 m/s predicted by empirical formulations.

P18, line 41-42 This sentence is unhelpful. All uncertainties influence the calculation results! Please delete unless you can impart something useful to the reader on the influence of input uncertainties.

Removed.

P19, lines 32-33 You have not provided any evidence on understanding overtopping dynamics, so I suggest you delete this sentence.

Removed.

P19, line 33 Delete 'primary'.

Removed.

P19, line 38 to 39 Delete this sentence.

Removed.

P20, line 44 ... the application of BIV can be useful in providing ...

Corrected

P21, line 7 Please provide details of funding support.

This will be provided in the published version. During the review process, funding are not mentioned to guarantee a double-blind review.

P22, line 1 Define (show equation for) Re.

Definition has been provided

P22, line 12 Define (show equation for) We.

Definition has been provided

P23 I assume that the publisher will put References into their chosen order.

This will be during the final editing

P24, line 33-34 Whilst interesting, I do not believe that this paper is relevant to the current paper.

We respectfully submit that our position differs from the Reviewer's one. We would like to suggest that it is kept, since it employed focused wave groups for wave overtopping, which we do consider relevant.

Reviewer B

I appreciate the extent and detail of the work that the authors have committed to their revisions.

The title is such an important aspect of any paper. Thank you for the adjusted version (my item 1). Thank you too for the improvements to the literature review (my item 4).

We would like to express our gratitude to the Reviewer B for their meticulous revision. We have addressed all comments hereafter.

On my item 2, re the underpinning PIV/BIV assumptions: thank you for the helpful commentaries in your response to me. You mention that "for brevity", these are not added to the manuscript itself. I'd push back

gently on this – if these even informal cross-checks are useful to me (which they are), I think that they are also useful to the readership.

Further considerations, based on Reviewer's previous comments have been added to manuscript, as follows:

Page 8, Lines 5-11

The velocity field in each interrogation cell is assumed to be uniform. Prior to analysing the full set of frames and generating results, the interrogation cell was carefully selected using an automatic algorithm in PIVlab, which proposes settings based on the image data in the chosen frame. While the evolving nature of the flow along the dike could lead to performance variations between frames, a random check confirmed that the selected settings produced consistent and expected results.

Page 8, Lines 15-16

The temporal evolution of the flow was considered constant over the timescale between image acquisitions. Visual observations indicate no significant changes in the timescale of the phenomenon, at least within the selected frames.

On my item 3, re the focussed wave, and re reproducibility – my apologies for missing the link to the publicly accessible Data Storage Plan. On the waves themselves, although I am not fully convinced of the utility of focussed wave groups in contributing to design guidance on overtopping, the overall rationale of exploring and appraising the BIV methodology in this setting is now clearer, which in turn supports the choice of waves here.

Thank you for your comment and appreciation.

My item 5 was on 'closing the loop' through quantitative comparisons with literature. The response here is less strong, but the additional acknowledgement of the desirability of this in 'further work' is helpful.

Thanks a lot for your consideration.

Overall, then, although the increment of knowledge and understanding remains rather limited, the manuscript now 'holds together' quite significantly better in terms of a clear and consistent narrative than the first version. As such, if the Editor is content with the current end point vs further work, I think that the manuscript can be progressed to publication, ideally with the very minor revision suggested above, under my "Item 2" commentary.

Thanks to the author for their interesting work, and to the Editor for allowing me to carry out this review which seems to have been useful.

ROUND 3

Reviewer A

We would like to express our sincere gratitude to the reviewer for their contribution, which has enabled us to make significant improvements to our manuscript. The responses to the Reviewer's latest comments are reported hereafter.

Thank you for the revisions. there remain three minor corrections to be made:

P2, 142 "formulae"

Corrected

P3, 120 This reviewer does not believe that your paper will "establish more accurate criteria for the design and assessment of the safety of coastal structures" per se, although acknowledges that the BIV technique may indeed improve the determination of overtopping velocities in physical modelling. Please reduce the claim.

The statement has been revised as follows:

The present study explores the potential of BIV to improve overtopping predictions and support the assessment of coastal structure performance.

P11, 13 "defences"

The word defence/defences has been checked and corrected everywhere.

.....

Reviewer B

Dear Authors - Thank you for your final minor modifications. I enjoyed learning about your work, and also enjoyed working (rather indirectly!) with you on the finalisation of the manuscript.

Dear Editor - Thank you for running this careful review process, and for allowing me to be part of it. Apologies for the short delay in responses along the way - I hope that the final result makes the short waits worthwhile.

Recommendation: Accept Submission

We would like to express our sincere gratitude to the reviewer for their contribution, which has enabled us to make significant improvements to our manuscript.