ICCE 2010

Shanghai, China

June 30 - July 5, 2010

32nd International Conference on Coastal Engineering

Book of Abstracts

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The 32nd International Conference on Coastal Engineering (ICCE 2010)

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Foreword

The 32nd International Conference on Coastal Engineering (ICCE 2010), which will be convened on June 30 to July 5, 2010, in Shanghai, is the first of its kind ever held in the mainland of China. Delegates from 46 countries will gather in this great event.

A total of 725 papers were submitted. After review jointly by Technical Paper Review Committee (TPRC), Coastal Engineering Research Council (CERC) and the Local Organizing Committee (LOC) of ICCE 2010, the abstracts-in-depth of 436 papers and 55 posters have been selected for inclusion in this Book of Abstracts.

With the rapid development of science and technology in recent years, much progress has been made in the basic theory, computational methodology and data processing approaches in coastal engineering studies; the understanding of various physical phenomena in coasts and seas has been deepened; and the relationship among various disciplines has become much closer. The accepted papers and posters cover the science and technology relating to planning, design, management and construction for coastal protection, estuary training and port engineering, including topics on wave; swash, nearshore currents and long waves; coastal management, risk and environmental restoration; sediment transport and morphology; and coastal structure. Interdisciplinary topics, covering more than three sub-disciplines, number quite a few, leading to the understanding that scientists of today and in the future need a more comprehensive and integrated ability to handle various problems. This conference will surely help to broaden the vision of coastal researchers and engineers, trigger new approaches and concepts, and promote the development of coastal engineering studies, which is the very goal of ICCE conferences.

We wish to express our sincere thanks to the organizer and hosting institutions of ICCE 2010 for their hard work to ensure the success of the conference; thanks also to the sponsoring and supporting institutions and exhibitors for their strong support of and active participation in the conference. We believe that delegates from all over the world will enjoy their participation in ICCE 2010 both academically and culturally.

May ICCE 2010 be a great success!

Xie Shileng
Chairman, LOC
ICCE 2010

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Paper No. 190

REDUCTION OF WAVE OVERTOPPING ON DIKES BY MEANS OF A PARAPET

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INTRODUCTION

The worldwide rise of the sea level reduces the freeboard of existing coastal constructions, and thus increases the overtopping. Above that, there is a tendency to protect the coastlines against a storm with higher return period, e.g. 1000 years, which also initiates a bigger overtopping discharge if such a storm would occur.

On the other hand, coastal structures are often restricted in height and space due to tourism, buildings, architectural reasons,... In this paper, an innovative crest design will be proposed to reduce wave overtopping without increasing the crest height of the structures: the parapet.

GEOMETRY

A parapet or return wall consists of a vertical wall with a seaward bent "nose", as presented in Figure 1. This construction can be integrated in the existing structure without increasing its crest height.

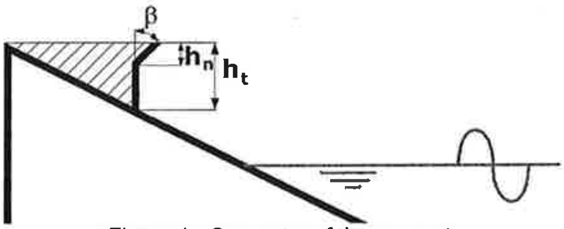

Figure 1 - Geometry of the parapet

TESTS AND OBJECTIVES

All tests in this study are carried out in the wave flume of the Coastal Engineering Laboratory of Ghent University, with dimensions 30m x 1m x 1.20m (length x width x height). Test results are presented by overtopping-formulae as described in the TAW guidelines (van der Meer, 2002). Three different slopes are tested (1/2, 1/4 and 1/6) to examine both breaking and non-breaking waves, as categorized in the TAW guidelines. Though, emphasis is put on the steepest slope ½ since that's the main geometry for the dikes along the Belgian coastline.

Within this study, lots of different angles β and height ratios $\lambda = h_n/h_t$ of the parapet are tested, to find an expression of the reduction as a function of β and λ. This reduction will be presented as a factor γ, and theoretically represents a virtual increase of the crest height.

RESULTS

According to the prediction formula for non-breaking waves, no reduction factors for a vertical wall should be included in the formula (van der Meer, 2002). Though, figure 2 shows that dikes with a vertical wall (yellow dots) overtop less than natural smooth dikes without this vertical wall (blue diamonds). Dikes with a parapet, constructed as in figure 1, reduce the overtopping discharge much more: the green triangles in figure 2 lie beneath all other points. Another remarkable fact in this graph is the scatter among the green triangles. This is due to the fact that all different geometries (angles and height ratios) of the parapet are plotted in the same graph. This leads to the conclusion that one general reduction factor for all geometries isn't valid. In the presentation, $\gamma_{parapet}$ will be presented as a function of the dimensionless parameters: angle β and height ratio λ.

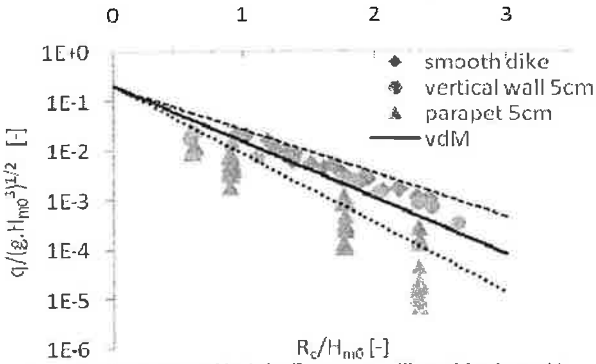

Figure 2 - Parapet of height 5cm on a dike with slope ½

The above described $\gamma_{parapet}$ (reduction of a parapet, compared to a vertical wall of the same height) and γ_v (reduction of a vertical wall compared to the natural smooth dike without vertical wall but with the same crest height) are now introduced on the abscissa of figure 2, which leads to figure 3. Due to this reduction factors, overtopping discharges can again be predicted well by the prediction-formulas in the TAW guidelines.

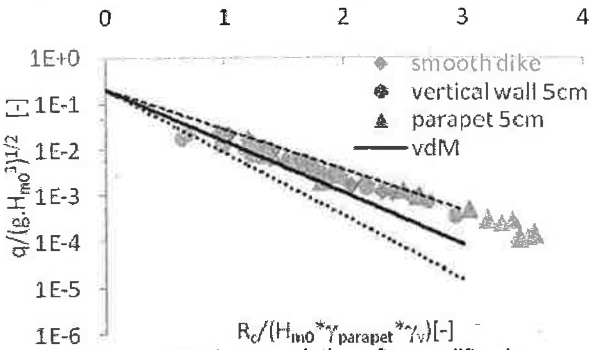

Figure 3 - improving correlation after modification

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