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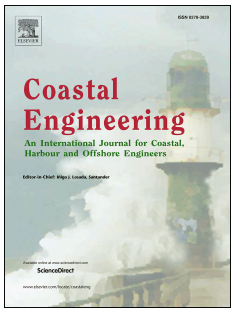

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A NEW METHOD TO ESTIMATE THE OVERTOPPING AND OVERFLOW DISCHARGE AT OVER-WASHED AND BREACHED DIKES

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Abstract

Most of the experience collected on wave overtopping is concentrated on emerged or zero-freeboard structures, and only few experiments are available on over-washed dikes. The experience on submerged crest conditions is principally dedicated to rubble mound structures and limited to the wave reflection and transmission processes. The existing tools for the prediction of the average wave overtopping discharge (q) at dikes are therefore targeted to represent overtopped structures, leading to cautious estimates at over-washed dikes and unrealistic overestimations in case of catastrophic scenarios such as breached dikes. This paper proposes a new conceptual and practical method for the prediction of q that is valid for both over-washed and fully breached dikes. It consists of three physically-based formulae whose coefficients are fitted on a new numerical database of smooth structures under variable wave attack. The predictions are compared with the new numerical results and the data and the tools available from the literature, i.e. experimental data, formulae and neural network. The new method gives a more realistic representation of the overtopping and overflow processes, reducing significantly the overestimation in case of breaching and being at least as accurate as the existing tools in case of over-washing.

Keywords: wave overtopping discharge; overflow; breaching; dike; conceptual method; climate change.