CLASH

CREST LEVEL ASSESSMENT OF COASTAL STRUCTURES BY FULL SCALE MONITORING, NEURAL NETWORK PREDICTION AND HAZARD ANALYSIS ON PERMISSIBLE WAVE OVERTOPPING

Introduction

Safe use of low lying and populated coastal regions depends critically on the performance of coastal structures in defending these areas against storm surges, wave attack, flooding and erosion. Continuous sea level rise and climate change (storms are becoming rougher) emphasise the need for reliable and robust prediction methods as higher storm surges and bigger storms may lead to flooding. The CLASH-project will produce generally applicable prediction methods on the required crest height of most coastal structure types, based on permissible wave overtopping and hazard analysis.

Start date T_0 of the project is January 2002, end date is December 2004 (3-year duration).

The project origins from two observations:

1. The proven fact that small scale model testing under predicts wave run-up on rough and permeable slopes.

2. The lacking of generally applicable prediction methods for crest height design or assessment with respect to wave overtopping.

The main scientific objectives of CLASH are:

1. to solve the problem of possible scale effects for wave overtopping,

2. to produce a generic prediction method for crest height design or assessment.

Methodology

The project will use two main approaches. Firstly, wave overtopping will be measured at three coastal sites in Europe (Zeebrugge, Belgium (Fig. 2); Ostia, Italy and Samphire Hoe, UK (Fig. 1)). Storms measured on these sites will be reproduced in small scale laboratory tests and by numerical modelling. Results will be compared and a firm conclusion on scale effects and how to deal with it will be drawn. Additional, effects of long waves on overtopping will be investigated by prototype measurements at Petten, the Netherlands. The second approach is to gather all existing data on wave overtopping in a homogeneous data base, to supplement that data base with the new full scale measurements and more small scale testing, and to develop a generally applicable design method. This new method includes the development of a neural network and will include conclusions on scale effects.

Fig. 1. *Overtopping event at Samphire Hoe (U.K.).*

Fig. 2. *Overtopping event at Zeebrugge (Belgium).*

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CLASH is divided into ten workpackages, which are strongly interconnected as shown in the interconnection diagram (Fig. 3).

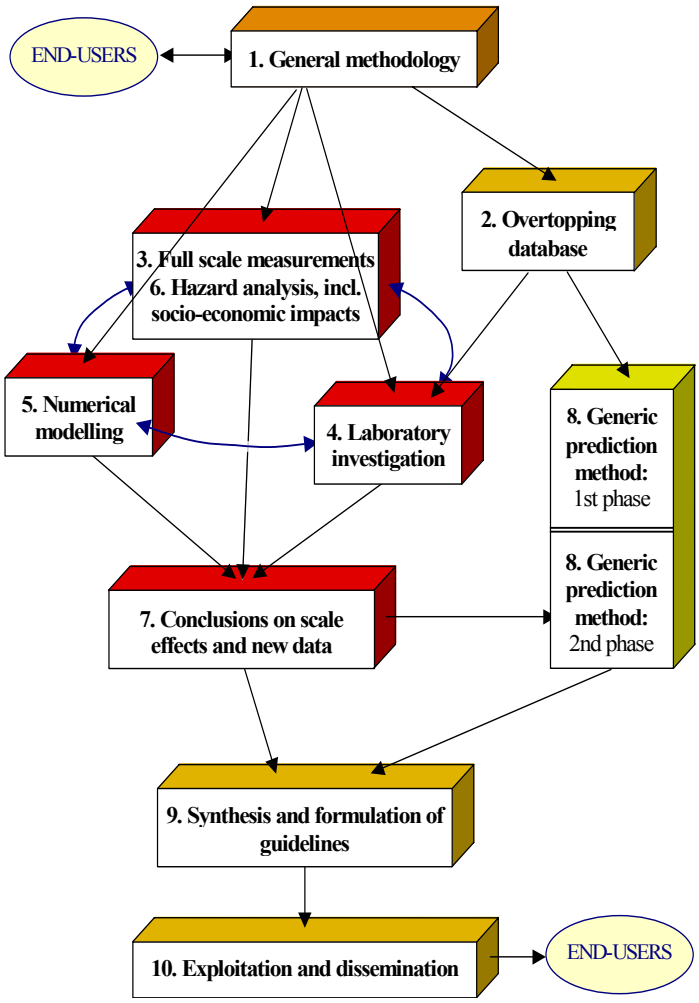

Fig. 3. *Interconnection digram between different tasks.*

Expected results

The project will result in generally applicable and well-validated guidelines on crest height design and assessment of coastal structures with regard to overtopping hazards. The guidelines will be published on the internet, including the prediction method by the neural network, and will be available for all researchers, consultants and owners of coastal structures. The guidelines and prediction method will be used for design and safety assessment of coastal structures and risk assessment of coastal areas.

Partnership

13 partners from 7 different European countries are involved in CLASH. These are:

- Ghent University (UGent), Belgium (coordinator)
- Flemish Community – Coastal Division (FCCD), Belgium
- Flemish Community – Flanders Hydraulics (FCFH), Belgium
- Leichtweiss-Institut für Wasserbau der Technischen Universität Braunschweig (LWI), Germany
- Aalborg University (AAU), Denmark
- Universidad Politécnica de Valencia (UPVLC), Spain
- Modimar (MOD), Italy
- Delft Hydraulics (DH), the Netherlands
- Infram (INF), the Netherlands
- National Institute for Coastal and Marine Management (RIKZ), the Netherlands
- Manchester Metropolitan University (MMU), United Kingdom
- The University of Edinburgh (UEDIN), United Kingdom
- Hydraulic Research Wallingford (HRW), United Kingdom

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