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Computational fluid dynamics (CFD) for “typical Dutch” houses failure: experiments and numerical modelling comparison.

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Computational fluid dynamics (CFD) for “typical Dutch” houses failure: experiments and numerical modelling comparison.

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Coastal and riverine floods can be a catastrophic natural hazard with importance consequences. Many of the casualties occurring during these events can be attributed to the collapse of residential houses, and it is thus required to gain knowledge about the failure mechanism of these structures. Multiple variables can lead to various flow conditions that will in turn represent different load pressures over the house; among these, the type of the material (used in the construction), the orientation angle in respect to the main flow direction, the shape of the structure, and the urban density (blockage ratio), are relevant. In the present paper, small scale experiments are compared with CFD simulations performed with openFOAM in order to obtain a numerical model than can predict different combinations of load pressures for various flood events.

The present study aims to represent different “typical Dutch” houses near or close to a dam break in which rapid high flow velocities and depths can be presented. The flow conditions and load pressures outputs are compared to physical results in order to validate the numerical model.