Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Tsunami-induced force and surface pressure on multiple rectangular buildings in an unsteady free-surface channel flow[1] ALIREZA BAHMANPOUR, IAN EAMES, University College London — We study the flow around multiple rectangular obstacles in an unsteady free-surface channel flow using a combination of mathematical models, computations and experiments. The unsteady flow is triggered by a dam-break. The total drag force and surface pressure distribution on the obstacles are examined. The height and length of the building are fixed; the influence of initial water height and blocking ratio b/w is studied. The force scalings are confirmed from the computational analysis and found to be consistent with the experimental results. The effects of the additional buildings on the total drag force are noted and compared against the case of a single building. Increasing the number of buildings as well as the blocking ratio results in the water to inundate further onshore. The pressure distribution on the individual surfaces are analyzed and shown to vary linearly with height from the building base and dominated by the hydrostatic component. We summarize the results in terms of a new Fr - b/w regime diagram and explain how the force on buildings subject to an unsteady flow can be estimated from the upstream velocity and water height.

[1]We would like to thank HR Wallingford for their continued support in funding the project.

Alireza Bahmanpour
University College London

Date submitted: 01 Aug 2016 Electronic form version 1.4