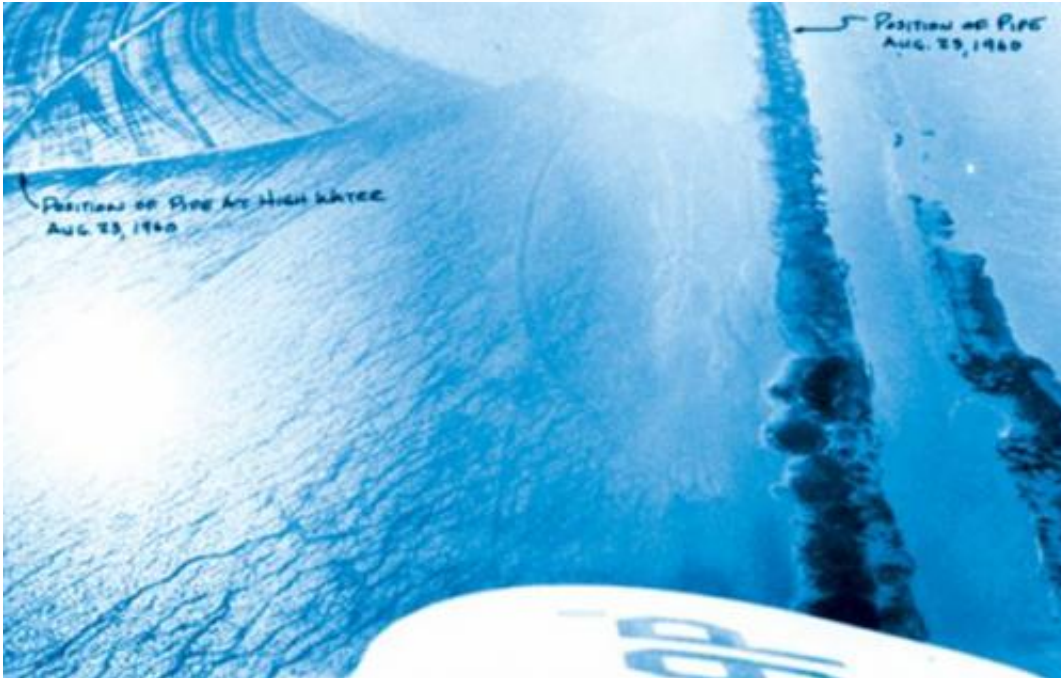


Liquefaction of seabed no longer a mystery

April 29 2014



This is a pipeline floatation accident. Taken from the paper by J.S. Damgaard, B.M. Sumer, T.C. Teh, A.C. Palmer, P. Foray and D. Osorio: "Guidelines for pipeline on-bottom stability on liquefied noncohesive seabeds" *Journal of Waterway, Port, Coastal and Ocean Engineering*, ASCE, vol. 132, No. 4, pp. 300-309, 2006. With permission from ASCE. Credit: *Journal of Waterway, Port, Coastal and Ocean Engineering*, ASCE, vol. 132, No. 4, pp. 300-309, 2006. With permission from ASCE.

The primary aim of the book is to describe liquefaction processes and their implications for marine structures such as marine pipelines, sea outfalls, quay walls, caisson structures, large individual blocks, sea

mines, etc. with the focus on physics of liquefaction, mathematical modelling, and assessment of liquefaction potential, supported by numerical examples.

Seabed under large waves during storms may undergo [liquefaction](#), a process in which the [seabed](#) sediment becomes liquid. Under this condition, sections of buried pipelines float to the surface of the seabed, heavy marine objects on the seabed such as breakwaters, caissons, sea mines, and pipelines sink and disappear into the seabed. How can this be explained?

Authored by renowned researcher and engineer Dr Mutlu Sumer and published by World Scientific, "Liquefaction Around Marine Structures", features physics of liquefaction induced by large waves, [mathematical modelling](#), floatation and sinking of marine objects in liquefied sediments. Although the main focus is the wave-induced liquefaction, it also discusses the seabed liquefaction caused by earthquakes. The book also addresses the issue of design of structures (against liquefaction) wherever it deems necessary, and provides guidelines via illustrated examples. Counter measures against seabed liquefaction is also discussed.

Many incidents with catastrophic consequences have occurred in the past due to wave-induced liquefaction of the seabed. There are also failures for which information never entered the public domain. Cost of such incidents is enormous, up to tens or even hundreds of million dollars.

The main cause of such incidents has been the fact that the structures (be it, for example, marine pipelines, or breakwaters, or caisson structures, or sea mines) have not been properly designed against liquefaction, and that has been due to the lack of knowledge, and the non-existence of guidelines for the design.

The present book essentially bridges this gap, for the first time, by collecting the state-of-the-art knowledge and building content, essentially based on the recent research conducted in the past two decades including two European research programs Liquefaction Around Marine Structures (LIMAS) and Scour Around Coastal Structures (SCARCOST) where the author was the Program Leader. The present book and the existing body of literature on earthquake-induced liquefaction (with special reference to marine structures) form a complementary source of information on liquefaction around marine structures, and will be used by consulting firms in the design of structures to ensure that incidents that occurred in the past with catastrophic dimensions can be avoided.

Dr. Mutlu Sumer is a Professor at the Technical University of Denmark, DTU Mekanik, Section for Fluid Mechanics, Coastal and Maritime Engineering. He has published two previous books with World Scientific, "Hydrodynamics Around Cylindrical Structures" and "The Mechanics of Scour in the Marine Environment".

More information: Book:

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