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ASSESSMENT OF THE PERFORMANCE OF BUND WALL SYSTEMS UNDER IMPACT LOADING

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The failure of storage tanks is a problem that has occurred in many countries around the world. Reasons behind the failure of storage tanks could be due to natural disasters or accidental releases. In all cases, the impact of such failures is deemed highly disastrous because it causes a huge economic loss in the stored material and harms the immediate community and the environment. The storage tank is also known as the primary containment and is usually surrounded by a secondary containment referred to as a bund wall, its purpose being to contain any spillage arising from the primary containment. In the UK, the bund wall is designed according to BS EN 1992-3:2006 and is usually constructed from plain or reinforced concrete. The standard specifies that the bund wall should be designed to withstand the hydrostatic pressure only, while in case of catastrophic failure, it is found that the dynamic pressure can be up to 16 times greater than the hydrostatic pressure [1]. According to the previous failures recorded in the literature, it has been shown that the bund wall failed to withstand the impact of dynamic pressure and subsequently collapsed. In this study, it is proposed to study the performance of a bund wall with different shapes under the effect of impact loading representing the catastrophic failure of a storage tank. This problem is modelled using Abaqus software where the fluid part is modelled using Spherical Particles Hydrodynamics (SPH) and the structural part is modelled using Abaqus explicit solver. The shapes investigated are rectangular and square. Results show that a bund of a square shape is more likely to collapse than a rectangular one.

REFERENCES

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