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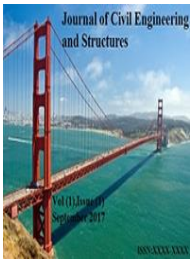

Investigation of influence the pressure and stress on the water in buried concrete pipes in the different soil under blast loading

Mojtaba Hosseini[1], Peyman Beiranvand[2*], Leila Kalantari[3]

[1] Associate Professor, Department of Civil Engineering, Lorestan University, Khorram abad, Iran
[2*] PhD Candidate, Department of Civil Engineering, Razi University, Kermanshah, Iran
[3] MSc, Department of Civil Engineering, Doroud Branch, Islamic Azad University, Iran
[*] Correspondence: peyman51471366@gmail.com; Tel.: +98-937-865-1620

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Abstract: Soil mantle is an effective factor in decreasing damege against explosion so, by increasing the density of the soil, the pressure and the stress on the buried pipe increased. In this research, a parametric study on the buried pipe in the soil and due to blast loading have been performed. Effect of various parameters such as physical properties of water, air, soil, concrete pipe and T.N.T have been investigated. The arbitrary Lagrangian-Eulerian (ALE) method has been used by the LS-DYNA software. The pressure on the pipe and the stress in the important point of the pipe have been obtained. The results show that, In general soil with the more density has more pressure and strees transfers on the pipe and if the density of soil is low, the damege to the pipe when the explosion occure is low and acts as a damper under waves of explosion.

Keywords: Explosion, Buried pipe, Lagrangian-Eulerian, Stress, Pressure..

1. Introduction

To study the effect of blast loads on the buried structures, in added to the experimental and semi-experimental methods, the numerical methods also can be used. The blast simulation has been performed in three stages: (1) explosion formation and generation the crater, (2) propagation of the blast waves, (3) calculation of the response of the structures. The numerical methods can be devided in three categories: cascaded method, incompletely compound method and completely compound method. Young and Hinman used the cascaded method to analyse the buried pipes [1,2].In this method the field stress on the pipe due to calcuted and then these stresses applied to the pipe as boundary condition. In the cascaded methods, the interaction between soil and pipe has been ignored. Althoug the method is simple but their results maight be unreal. Zimerman combined the stage 1 ans 2 above, and reduced the simulation to two stage [3].He modeled the soil by the finited difference method, The structure by the finite element method, and considered the blast loading as pressure time history.He concluded that this method is unsuitable for unsymmetric structure and lie in the low depth. The completely compound, use by Wang and Lu [4].In this method all the three stage have been considered simultanously. They modeled the soil near the explosion by the smothed-particle-hydrodynamics (SPH) method, and the soil far from the explosion by the finite element method. Yao studied the buried pipe subjected to the blast loading , but in their investigation, there is no fluid in the pipe [5].Yan and Xu simulated the peak over pressure of the blast on the air [6].Anirban studied the effect of surface blast on the dry and cohesion less soil. He used the ALE method and concluded