

EXPLOSION RESPONSE OF A BURIED STRUCTURE IN A SOIL-ROCK LAYERED MEDIUM

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ABSTRACT

The paper focuses on a buried structure in a soft soil layer that is laid above a rock bed. An explosive charge is placed in the rock layer. A comprehensive approach to simulate the behavior of the soft soil with the embedded structure as well as of the bedrock due to the explosive action in the rock mass is presented. The developed numerical algorithm to simulate the shock wave propagation within the medium considers both the bulk and deviatoric deformations and takes into account the possible shear damage accumulation. It takes into account the contact conditions between the layers to simulate the shock wave transmission and the soil-structure interaction including the possible separation between the structure and the surrounding soil during the dynamic response. The soil-lining interaction problem is solved by a combination of the variational-difference method (for the lining) and of the Godunov's method (for the soil). The coupling of these two approaches is performed by calculation of the contact stresses and velocities on the soil-lining boundary. Analysis of the contact stresses at the soil-structure interface, was carried out. The effect of the charge location as well as the effect of the soil-rock interface on the structure response was investigated.