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BRZINE SEIZMIČKIH VALOVA KAO POKAZATELJ MOGUĆNOSTI OTKOPAVANJA SEDIMENTNE STIJENSKE MASE

Sažetak: Odabir tehnologije otkopavanja predstavlja jedan od vrlo važnih i zahtjevnih zadataka prilikom planiranja iskopa u čvrstim stijenama, bilo na površinskom kopu ili građevnoj jami. Raznolikost značajki stijenske mase ima velik utjecaj na učinkovitost primjene određene tehnike i tehnologije otkopavanja. Što je stijenska masa raspucanija, lakše će se otkopavati. Diskontinuiranost je dobro poznata karakteristika stijenskih masa, pogotovo sedimentnih, a ta se značajka vrlo uspješno istražuje primjenom neinvazivnih, brzih i relativno jeftinih seizmičkih geofizičkih metoda. Rezultat seizmičkih istraživanja su brzine kompresijskih ili primarnih P-valova, te posmičnih ili sekundarnih S-valova. Neke od metoda iz literature kao glavni pokazatelj za procjenu mogućnosti otkopavanja stijene koriste navedene brzine seizmičkih valova. U ovom radu prikazana je primjena više takvih metoda na primjeru kategorizacije stijenske mase za potrebe iskopa u trajektnoj luci Žigljen na otoku Pagu. Prilikom terenskih mjerenja korištene su geofizičke metode plitke refrakcijske seizmike (SRS) i višekanalne analize površinskih valova (MASW). Na temelju izmjerenih brzina seizmičkih valova, stijenska masa na istražnoj lokaciji je prema svim korištenim metodama klasifikacije kategorizirana kao materijal koji se ne može strojno kopati, nego je potrebno miniranje uz primjenu minskih bušotina i eksploziva.

Ključne riječi: Otkopavanje stijenske mase, brzina seizmičkih valova, geofizičke seizmičke metode, kategorizacija materijala za iskop, miniranje.

SEISMIC WAVES VELOCITIES AS AN INDICATOR FOR ASSESSING EXCAVATABILITY OF SEDIMENTARY ROCKS

Summary: The selection of excavation technology is one of the very important and demanding tasks when planning excavation in solid rocks, whether on a surface mine or construction pit. The variety of rock mass characteristics greatly influences the application efficiency of a particular excavation technique and technology. The discontinuous rock mass is easier to excavate compared to solid rock mass. Discontinuity is a well-known characteristic of rock masses, especially sedimentary ones, and this feature is very successfully investigated using non-invasive, fast and relatively inexpensive seismic geophysical methods. The results of seismic investigations are the velocities of compression or primary P-waves and shear or secondary S-waves. Some of the methods from the literature use the mentioned seismic wave velocities as the primary indicator for assessing the possibility of rock excavation. This paper presents the application of several such methods on the example of rock mass categorization for excavation in the ferry port Žigljen on the island of Pag. During field measurements, geophysical methods of shallow refractive seismic (SRS) and multichannel analysis of surface waves (MASW) were used. Based on the measured seismic wave velocities, the rock mass at the investigation site was categorized as a non-mechanically excavated material according to all classification methods employed. Therefore, blasting with the use of blast holes and explosives is recommended for excavation.

Key words: Rock mass excavation, seismic waves velocity, geophysical seismic methods, categorization of excavation material, blasting.

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