

ATTENUATION OF SEISMIC AMPLIFICATION ON TUNNEL USING BY METASOIL

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Amplification of SV-propagated waves due to a triangular hill on a tunnel passed through it, and reduction of its destructive effect by MetaSoil has been analysed. MetaSoil (MS) is a chair of cells made by some materials like lead and nylon to able to attenuate seismic amplifications (Maleki and Khodakarami, 2017). On the other words, the main goal of this article is to assess using this chair of cells around a mountain to protect a structure passed through it. Models analysis has been conducted by Finite Element Method (FEM). Soil medium is assumed to be elastic, homogenous and isotropic. Absorbing boundaries have been used on both side of model and bedrock fixed. SV-propagated waves are produced by Ricker type waves, because results are intensely relied on frequency; thus, different frequencies were considered, here.

According to the results, using MS lead to attenuation of seismic responses, considerably. In fact, a displacement as SV waves is applied on the bedrock; then, the responses have been received on four points around tunnel (see Figure 1) with and without MS. In addition, there are two different models in order to investigation of MS effect on results. The results indicate that responses have been reduced from 30% up to 40% (as it is shown in Figure 2).

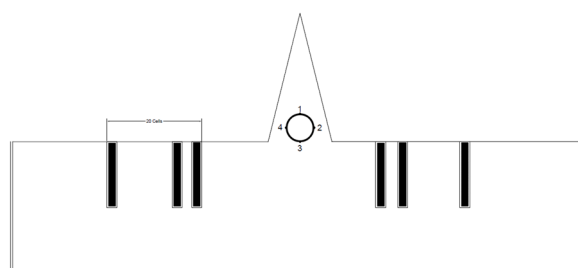


Figure 1. Schematic shape of model.

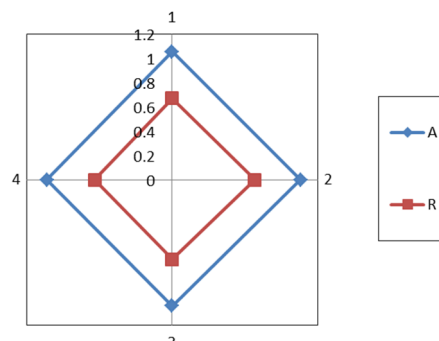


Figure 2a. Amplification (A) and its Reduction (R) on four certain points around tunnel.

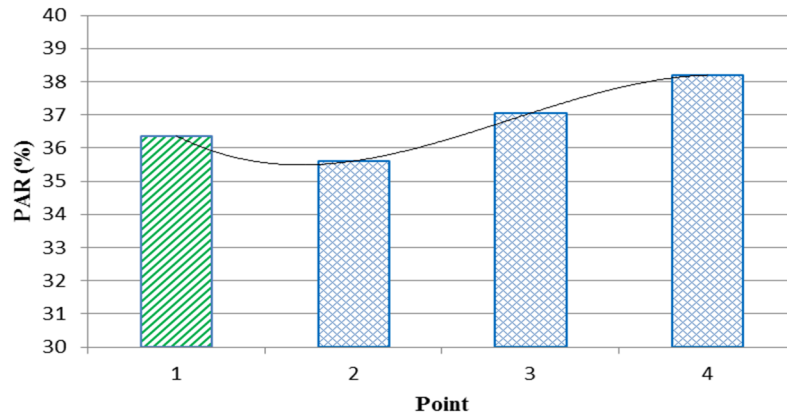


Figure 2b. Percentage of Amplification Reduction (PAR) on points around tunnel.

Amplifications on low frequencies have had more tense than the high ones. However, the most Percentage of Amplification Reduction was occurred on this case. Generally, it is recommended that this proposed method as a practical and useful way of protection of rock tunnels has been used.

REFERENCES

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