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周期荷载作用下土钉支护的累积效应有限元分析

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摘 要：针对交通荷载下土钉支护边坡的力学特征，将交通荷载简化为循环荷载，以室内模型试验为基础，基于Mohr-Coulomb准则，建立土钉支护动力稳定分析的弹塑性平面应变有限元模型，加载频率为2 Hz，加载幅值为10~30 kPa。研究结果表明：坡面位移随循环加载次数增加而增大，出现明显的累积效应，坡顶沉降出现沉降槽，累积效应不明显；土钉轴力的变化与位置有关，在动载下，靠近坡顶的轴力增加较大，但随着循环加载次数增加出现衰减效应，下部土钉轴力变化不大；室内模型试验结果与数值模拟结果存在一致性。

关键字：周期荷载；土钉支护；土钉轴力；坡顶沉降；累积效应

Accumulative effect of soil nailing under cyclic load through finite element analysis

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Abstract: According to the mechanism of soil nailing, traffic load was simplified as cyclic load, an elasto-plastic finite element model was set up under dynamic load based on Mohr-Coulomb criterion, with frequency of 2 Hz and load intensity of 10-30 kPa. The results show that the displacement of panel increases with the increase of cyclic load number, indicating obvious accumulative effect. The shape of settlement of slope crest is half-bowl with unobvious accumulative effect. Axial force of soil nails has obvious increment at upper position, whereas no distinct increment at lower position, and the increment shows attenuation with cyclic number. The experimental results are in accordance with the simulated ones.

Key words: cyclic load; soil nailing; axial force of soil nails; settlement of slope crest; accumulative effect

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