水泥混凝土路面路基应力水平分析

Analysis on Stress Level of Subgrade under Cement Concrete Pavement

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中文关键词:水泥混凝土路面　路基　应力水平　有限元

英文关键词:cement concrete pavement　subgrade　stress level　finite element analysis

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中文摘要

通过系统的参数分析，探明了影响路基应力的主要因素，并确定了相应参数在模型中的取值，以此建立三维有限元分析模型。采用该模型对典型水泥混凝土路面结构的荷载应力进行计算，分析了轴重与轴型对路基应力计算深度和荷载应力分布的影响。结果表明，随着轴重和轴数的增加，路基应力计算深度不断扩展，同时该范围内的应力级位也不断提高；多轴荷载应力的叠加效应在路基深层愈加显著。通过叠加自重应力获得路基中的应力状态，经统计分析表明，路基主应力覆盖范围为$30kPa<\sigma_1<90kPa$，$10kPa<\sigma_3<40kPa$，主应力比的变化范围为1.9~6.0。当轴载增加1倍时，路基中的应力级位约提高10kPa。这将对路基性能造成显著影响，因而在路面结构设计中应予以考虑。

英文摘要

Factors affecting the stress level of subgrade were investigated through systemic parameter analysis, and then a 3D finite element model was established and used for load stress analysis. For typical cement concrete pavement structure, the stress of subgrade was calculated under all kinds of gear weight and configuration. Analysis result indicates that the depth of subgrade workaround and the stress level in the region were raised with increasing the gear weight and the number of axis. The stress induced by multi-axis was overlapped in the deep-seated subgrade. The stress state of subgrade was calculated by adding the at-rest pressure to the load stress which was compute by finite element analysis. The statistical result of stress state illustrates that the maximums and minimums principal stress was ranged in 30~70kPa and 10~40kPa respectively, and the principal stress ration was fluctuated between 1.9 and 6.0. The magnitude of stress in subgrade was increased 10kPa when the applied load enhanced from 100kN to 200kN, which will impact the mechanical behavior of subgrade dramatically. Thus, it is need to consider the stress-dependent behavior of subgrade in pavement design.

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