

砂固结预应力锚杆锚固性能的颗粒流数值分析

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摘要 基于颗粒流理论, 建立分析砂固结预应力锚杆锚固性能的颗粒流数值分析模型。通过数值模型试验, 对砂固结预应力锚杆的荷载 - 位移特性以及砂颗粒在载荷作用下的应力、位移及孔隙率变化规律等微观特性进行分析。分析结果表明: 加载初期挡板位移增长较快; 而随着荷载逐级增大, 表现出位移增量的逐级收敛性; 随挡板移动, 砂颗粒内部孔隙率及其相互之间的接触力从距离挡板由近及远分别经历孔隙率减小、颗粒接触力增大的过程, 并最终分别趋于稳定。通过与室内模型试验结果相对比, 验证数值模拟的正确性, 并通过对挡板埋置深度、砂体初始孔隙率、挡板宽度等因素的分析, 探讨影响砂固结预应力锚杆锚固性能的一些因素。

关键词 [数值模拟](#); [砂固结预应力锚杆](#); [锚固性能](#); [颗粒流](#)

分类号

NUMERICAL ANALYSIS OF ANCHORAGE PERFORMANCE ON SAND CONSOLIDATED ANCHORAGE PRESTRESSED BOLT BY PARTICLE FLOW CODE

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Abstract

Based on the theory of particle flow code(PFC), the numerical analysis model is established to study the anchorage mechanism of sand consolidated anchorage prestressed bolt. According to the numerical model tests, the relationship between pulling force and displacement of loading plate is studied, and the microscopic characteristics of sand particle under the load such as the stress filed, displacement filed and the variation rule of porosity are analyzed. Conclusions can be drawn as follows: the displacement of loading plate increases quickly in the earlier stages of loading, but the increment gradually reduces with the increasing of loading. Along with the moving of loading plate, the interior porosity and the mutual contact force among sand particles will experience reducing and increasing courses with the distance extended from the loading plate, but finally they all can be reached to stabilization. By comparing the results with those of the indoor model tests, the conclusions of numerical simulation are proven to be reasonable. Finally, some factors that may influence the anchorage performance such as embedment deepness of loading plate, original porosity and the breadth of loading plate, are analyzed.

Key words [numerical simulation](#); [sand consolidated prestressed bolt](#); [anchorage performance](#); [particle flow code\(PFC\)](#)

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