

硬化土本构模型在FLAC3D中的开发及应用

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DEVELOPMENT AND APPLICATION OF HARDENING SOIL CONS FLAC3D

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摘要

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摘要 基于塑性增量理论, 推导硬化土本构模型的有限差分格式。在VC++编程环境下, 利用FLAC3D提供的二次开发平台, 土本构模型的有限差分程序, 实现硬化土本构模型在FLAC3D中的二次开发, 并给出二次开发的步骤、方法和编程要点。通过应力路径室内试验结果与采用不同本构模型的FLAC3D数值计算结果进行对比分析, 验证硬化土本构模型在FLAC3D中二次开发的正确性和必要性。对比分析表明: 采用硬化土本构模型的FLAC3D数值计算结果与试验结果吻合较好, 而且硬化土本构模型的模型参数可以通过常规三轴试验获得, 模型参数简单, 硬化土本构模型不仅能够反映土体的非线性特性, 还能够反映深基坑工程复杂的应力路径。与土体本构模型相比, 硬化土本构模型更适合用于深基坑工程的计算分析。硬化土本构模型在FLAC3D中二次开发的实现, 扩大了FLAC3D的适用范围, 在一定程度上弥补FLAC3D在分析岩土工程尤其是深基坑工程方面上的不足。

关键词: [基坑工程](#) [复杂应力路径](#) [硬化土本构模型](#) [FLAC3D](#) [二次开发](#) [应力路径试验](#)

Abstract: The finite difference scheme of hardening soil constitutive model is derived based on the incremental theory of plastic. The finite difference program of hardening soil constitutive model is established so as to realize the secondary development of hardening soil constitutive model is realized with the platform for secondary development offered by FLAC3D software in VC++ environment. And then, the steps, methods and programming essentials of constitutive model's secondary development based on FLAC3D software are given. The comparative analysis between test results under different stress paths and FLAC3D numerical simulation results with different constitutive model is made so as to verify that the development of hardening soil constitutive model in FLAC3D is correct and necessity. Comparative analysis shows that the FLAC3D numerical simulation results with hardening soil constitutive model accord with test results. The parameters of hardening Soil constitutive model is simply can be easily determined by conventional triaxial test. Hardening soil constitutive model can not only reflect nonlinear characteristics of soil, but also can reflect complex stress path of deep foundation pit engineering. Hardening soil constitutive model is more suitable for computing analysis of deep foundation pit engineering compared with other constitutive model of soil. Implementation of secondary development that hardening soil constitutive model is developed in FLAC3D software expands the scope of FLAC3D application, to some extent makes up for disadvantages of FLAC3D in analysis of geotechnical engineering, especially deep foundation engineering.

Keywords: [foundation pit engineering](#) [complex stress paths](#) [hardening soil constitutive model](#) [FLAC3D](#) [secondary development](#) [stress path tests](#)

Received 2013-01-30;

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