

多功能共振柱刚性试件试验的可靠性分析

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摘要 对我国自行研制的多功能共振柱试验机测试刚性试件动剪切模量的可靠性进行研究, 提出了一种修正系数方法, 给出了测试刚性试件时的自振和共振修正曲线。试验中, 6个不同刚度试件10次自振试验和10次共振试验的频率误差最大均不超过4%, 10次自振试验曲线之间的相关性也很好。比较了3种修正系数拟合模型, 给出了修正曲线最佳拟合方式。对3种已知模量的刚性试件进行了自振和共振试验, 采用修正曲线得到的结果与已知值的最大误差不超过10%。表明提出的修正系数方法和修正曲线可靠, 新设备测试精度和稳定性良好, 可用于小应变范围内硬质材料动剪切模量的实际测试。

关键词 [岩土力学](#); [多功能共振柱试验机](#); [动剪切模量](#); [刚性试件](#); [可靠性](#); [误差分析](#)

分类号

RELIABILITY OF MULTI PURPOSE RESONANT COLUMN DEVICE IN TESTING RIGID SPECIMENS

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Abstract

The reliability of the multipurpose resonant column testing device, newly developed by the Institute of Engineering Mechanics, China Seismological Bureau, is investigated by testing the dynamic shear modulus of the rigid samples. In order to obtain the dynamic shear modulus of rigid samples, a revised coefficient method is presented by using several samples with known rigidities and then the revised curves of free-vibration and resonant-vibration are obtained. In the tests, the maximum error of ten tests of free-vibration and ten tests of resonant vibration on six kinds of steel specimens are all less than 4%. The correlation between curves of ten tests of free vibration on the steel specimens is good. By comparison of three fitting models for the revised coefficients, the best fitting formula for the revised curves is chosen. The free vibration and resonant vibration tests for three kinds of rigid samples with different known modulus are conducted, and the maximum error between the real values and the tested values obtained by the revised coefficient method is less than 10%. These results indicate that the revised coefficient method and curves presented in the paper are reliable and the new device is accurate and stable.

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So, the device can be used for testing the dynamic shear modulus of the rigid materials in small stain range.

Key words

[rock and soil mechanics](#); [multipurpose resonant column device](#); [dynamic shear modulus](#); [rigid specimen](#); [reliability](#); [error analysis](#)

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