



论文摘要

中南大学学报(自然科学版)

ZHONGNAN DAXUE XUEBAO(ZIRAN KEXUE BAN)

Vol.41 No.2 Apr.2010

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文章编号: 1672-7207(2010)02-0685-07

常幅循环荷载下岩石的变形特性

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摘要: 利用RMT-150B岩石力学多功能试验机, 对花岗岩进行常幅循环加载试验, 研究循环加载过程中岩石的变形特性。试验结果表明: 岩石疲劳破坏时的变形量保持相对稳定, 而且这一变形量与静态全过程曲线破坏后区对应上限应力处的变形量相当, 验证了极限变形规律; 岩石的轴向应变、横向应变和体积应变都具有3阶段演化规律, 3阶段的划分基本一致; 横向应变的3阶段规律比轴向应变的明显, 横向应变速率亦大于轴向应变速率, 因此, 从变形的角度建立岩石的疲劳破坏准则则更可靠, 采用横向变形或横向变形速率作为岩石疲劳破坏或失效的判据, 更有利于工程应用。

关键字: 花岗岩; 常幅循环荷载; 疲劳; 变形

Deformation characteristics of rock under constant amplitude cyclic loading

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Abstract: The deformation characteristics of granite under constant amplitude cyclic loading were studied with multi-function apparatus RMT-150B. The results verifies the law of ultimate deformation, that is, the ultimate strain to failure under cyclic loading almost keeps constant and is equal to that of post-peak stress-strain curve corresponding to the maximal cyclic stress. Meanwhile, the three-phase evolution law is found in not only axial strain but also lateral and volumetric strains. These strain curves can be divided into the three phases based on their developing rates. Moreover, The three-phase evolution law is more obvious and the developing rate is bigger in lateral strain than in axial strain. Therefore, it is more feasible and reliable to form the fatigue failure criterion in strain space and more convenient to use lateral deformation or lateral deformation rate as the criterion of fatigue failure in engineering.

Key words: granite; constant amplitude load; fatigue; deformation

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