

综述评论

滞后细观模型在岩石力学中的应用

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摘要 对以砂岩为代表的所谓“NME材料”的力学行为研究方面的一些新的概念和模型进行了评介. 首先介绍了一种基于所谓“滞后单元”的描述滞后现象的物理模型——Preisach-Mayergoyz (P-M) 模型, 然后详细阐述了P-M模型应用于模拟岩石的非线性滞后应力应变关系的过程和结果. 这种唯象模型很好地描述了宏观上的滞后表现和“离散记忆”效应. 接着本文对应变能耗散的力学机制进行了简单分析. 最后, 介绍了一种描述弹性波在“NME材料”中传播规律的数学方法, 该方法从一般的弹性波传播规律出发, 分析了“NME材料”特殊的力学性质给弹性波传播带来的影响, 揭示了产生特殊的弹性波传播规律的原因.

关键词 [非线性细观弹性材料](#) [离散记忆效应](#) [P-M模型](#) [滞后细观弹性单元](#)

分类号

APPLICATION OF A HYSTERETIC MESOMECHANICAS MODEL IN ROCK MECHANICS

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Abstract

The paper reviews some new concepts and models that are proposed RECENTLY to study the mechanical properties of the so called nonlinear mesoscopic elastic materials (NME materials) represented by sandstone. First, a physical model, the Preisach-Mayergoyz (P-M) model, is introduced. P-M model is then used to simulate hysteresis based upon the so-called hysteretic units. The simulation procedure and the results for the nonlinear hysteretic stress ans stain behaviour of rocks using the model are depicted in detail. The macroscopic hysteretic behaviour and discrete memory in the stress-strain relation of rocks can be well simulated by this phenomenological model. Then, the paper performed the analysis on mechanical mechanism of energy dissipation. At the end , a mathematic method is based on the general elastic wave propagation law, and used to analyze the influence of special properties from NME materials on elastic wave propagation. Therefore, the reason the elastic wave propagating unusually in NME materials was revealed.

Key words [nonlinear mesoscopic elastic materials](#) [discrete memory](#) [Preisach-Mayergoyz model](#) [hysteretic mesoscopic elastic unit](#)

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