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论文

含障碍体平直断层标本变形过程中群体微破裂事件的时空演化特征

蒋海昆

1 山东省地震局，济南 250014 2 中国地震局地质研究所中国地震局构造物理开放实验室，北京 100029

摘要： 设计了含圆柱形障碍体的平直断层物理模型，在概念上可模 拟断层面上与地震孕育相关的障碍体等强固区域. 开展了中等尺度岩石标本的双轴压缩实验 ，研究标本在变形过程中群体微破裂事件的时空演化. 结果表明：(1)由于标本预置断层两 盘与障碍体之间、以及断层两盘彼此之间复杂的相互作用，使得交替活动成为含障碍体平直 断层标本变形过程中最为显著的特征； (2)含障碍体平直断层标本能够发生动力学失稳的前 提条件是障碍体在外加载荷作用下首先发生破坏，微破裂群体在障碍体破坏前后显示不同的 时空演化特征；(3)含障碍体平直断层标本失稳前的总变形量较大，弹性变形阶段微破裂累 积频次呈指数增长. 而在其后的位移弱化阶段，在障碍体及围绕障碍体的围岩区域内微破裂 事件稀少，突发失稳发生在相对平静的背景之上；(4)不同构造组合变形过程中的微破裂群 体具有明显不同的 b值，b 值与构造相关的区域性差异是明显的.

关键词： 声发射 平直断层 障碍体 差应力 双轴压缩实验

SPATIAL TEMPORAL CHARACTERISTICS OF ACOUSTIC EMISSION OF ROCK SAMPLE WITH REGULAR FAULT AND A COLUMNAR BARRIER DURING DEFORMATION

JIANG HAIKUN

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蒋海昆

1 Seismological Bureau of Shandong Province, Ji'nan 250014, China 2 Institute of Geology, Laboratory of Tectonophysics, China Seismological Bureau , Beijing 100029, China

Abstract: A physical model of regular fault containing a columnar barrier is des igned, which can conceptually be used to simulate the barrier or strong area con cerning the earthquake pregnancy. Biaxial compression experiment on middle size rock sample with a regular fault and a columnar barrier is carried out, and the spatial temporal characteristics of acoustic emission(AE) is studied. Results show that (1) Due to the complex actions between the hanging wall and lower wall , as well as the barrier, an alternate AE activity in different areas becomes th e most remarkable feature during deformation process of the sample. (2) The pre condition for instability of regular fault containing a barrier is that the ba rrier should be failed firstly with the increase of the loading. Very different AE spatial temporal features are shown before and after the barrier failure. (3) The total deformation amount of this sample is larger and its cumulated AE fre quency increases exponentially. During the later weaken period, there are only a few AE events in barrier and surrounding area. Abrupt instability happens under such a relative quiet background. (4) The values of b of G R relationship for different pre setting tectonic patterns have some obvious differences, the regi onal differences of b value related to different tectonics are remarkable.

Keywords: Acoustic emission Regular fault Barrier Di fferential stress Biaxial