地球物理学报 2008 50 (6): 1826～1834 ISSN: 0001-5733 CN: 11-2074/P

地裂缝破裂扩展的大型物理模拟试验研究

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收稿日期 2007-4-11 修回日期 2008-9-8 网络版发布日期 2008-11-17 接受日期

摘要 通过大型物理模拟试验，研究了具有正断层性质的隐伏地裂缝破裂扩展时，下伏断层位错引起上覆土体中的应力场和位移场等的变化规律，以及隐伏地裂缝向上破裂扩展模式和平、剖面结构特征，并对裂缝的破裂过程进行了分析；将模拟试验结果与西安地裂缝的破裂扩展模式及建筑物的破坏模式进行对比分析发现，模拟试验结果与西安地裂缝剖面结构不一致，但与地裂缝带上建筑物的破裂形式相一致，这证明了西安地裂缝的形成年代较为久远，是一种早就存在的接近地表的构造破裂面，过量开采地下水则使其重新开启而形成地表裂缝.大型物理模拟试验取得的重要成果对于揭示西安地裂缝的成因机理具有重要的指导意义.

关键词 地裂缝 扩展机理 破裂模式 物理模拟试验
分类号 P512
DOI:

Large-scale physical simulative experiment on ground-fissure expansion mechanism

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Received 2007-4-11 Revised 2008-9-8 Online 2008-11-17 Accepted

Abstract For a buried ground-fissure of normal fault type propagating and expanding upwards, the variation of stress and displacement field in overlying strata caused by the dislocation of underlying fault, the fracturing mode, and the planar and sectional characters were studied through large-scale physical experiment, also the breaking process of ground fissure was analyzed. Compared with the fracturing mode of Xi′an ground fissure and destruction pattern of buildings, it can be found that, the experiment result was consistent with the destruction pattern of buildings, but not with the profile structure of Xi′an ground fissure. This shows that Xi′an ground fissure has come into being long time ago, and it′s a kind of tectonic fracture adjacent to earth′s surface. The groundwater pumping is the very reason of Xi′an ground fissure′s renewed activity and causes it to be exposed on the earth surface. The results from the large-scale physical simulative experiment will guide us to reveal the genesis secret of Xi′an ground fissure.

Key words Ground-fissure; Expansion mechanism; Fracturing mode; Physical simulative experiment

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