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# 渭河盆地地裂缝群发机理及东、西部地裂缝分布不均衡构造成因研究

张勤[1,2], 瞿伟[1,2], 彭建兵[1,2], 王庆良[3], 李振洪[4]*

1. 长安大学地质工程与测绘学院,西安 710054;
2. 西部矿产资源与地质工程教育部重点实验室,西安 710054;
3. 中国地震局第二监测中心,西安 710054;
4. 英国格拉斯哥大学地理与地球科学学院,英国 8QQ

## Research on tectonic causes of numerous ground fissures development mechanism and its unbalance distribution between eastern and western of Weihe basin

ZHANG Qin[1,2], QU Wei[1,2], PENG Jian-Bing[1,2], WANG Qing-Liang[3], LI Zhen-Hong[4]*

1. College of Geology Engineering and Geomatics, Chang'an University,Xi'an 710054,China;
2. Key Laboratory of Western China's Mineral Resources and Geological Engineering Ministry of Education,Xi'an 710054,China;
3. Second Monitoring and Application Center,CEA,Xi'an 710054,China;
4. College of Geographical and Earth Sciences,University of Glasgow G128QQ,United Kingdom

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摘要 利用渭河盆地2001—2008年高精度GPS监测资料,结合区域构造特点建立了渭河盆地有限元动力学模型,基于此研究了区域现今地壳应力场特征,深入分析了构造应力场与盆地内地裂缝群发之间的内在关系,首次基于空间大地测量定量的揭示出了区域构造应力场与盆地内地裂缝群发的内在动力学联系,及盆地东、西部地裂缝分布不均衡的根本成因.研究结果表明:渭河盆地现今地壳应力场差异性显著,主要呈现出中、东部以NW-SE向拉张为主,西部则以NW-SE向压缩应力为主,整体具有相对左旋运动趋势,与区域以往长期构造变形具有较好的继承性;分析揭示出区域NW-SE向拉张构造应力正是盆地内中、东部地裂缝群发的力源机制,而盆地内差异性构造应力场也正是导致盆地东、西部地裂缝发育不均衡的根本原因所在,由此进一步证实了渭河盆地地裂缝的强构造属性,其是由活断层在上述力源机制作用下,以蠕滑形式错断地层使土层破裂而形成的.本文研究结果为盆地地裂缝灾害防治、城市安全建设提供了重要信息.

关键词 渭河盆地, 地裂缝, GPS, 构造应力场, 有限元

Abstract: Based on the high precision GPS monitoring data from 2001 to 2008, the finite element dynamic model of Weihe basin is established combined with its tectonic characteristics. Using above model the regional crustal stress field characteristics is studied, and the intrinsic relationship between the tectonic stress field and numerous ground fissures of Weihe basin is also analyzed thoroughly. For the first time the inherent dynamic relationship between the tectonic stress field and numerous ground fissures of Weihe basin is revealed quantitatively by the spatial geodetic, And the root causes of its unbalanced distribution between eastern and western of Weihe Basin is also revealed.. The results show that the present crustal stress fields of Weihe basin have significant difference, the eastern part mainly shows extension stress field with NW-SE direction while the western part mainly shows compression stress field with NE-SW direction, and overall showed relatively sinistral movement trend, which has good inheritance with the regional previous long-term tectonic deformation. The analysis discloses that the regional tensional stress field with NW-SN direction is the power source mechanism of numerous ground fissures development in the central and eastern of Weihe basin, while the differences of tectonic stress fields is also the fundamental reason for cracks unbalanced development in the eastern and western of Weihe Basin. Further analysis shows that the ground fissures in the Weihe Basin have strong tectonic characteristic, they are shaped by active faults with creep slipping ruptured soil under above power source mechanism. It is believed that the results in this paper could provide important information for the prevention of basin ground fissures disasters and city safety constructions.

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