

# 罗湖断裂带地应力场三维有限元模拟分析

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**摘要** 罗湖断裂带位于深圳—五华断裂带的南西段, 由13条NE向断层和6条NW向断层组成, 断裂分布密集。该断裂带位于深圳市区, 周围高楼林立, 其中的F8断裂被证实为活断层并于1994年曾有过异常活动, 因而对于该断裂带的构造活动性进行研究意义重大。在对罗湖断裂带地质特征研究的基础上, 建立起三维地质模型, 采用弹塑性有限元法对断裂带地应力场进行数值模拟。根据模拟结果, 分析罗湖断裂带地应力的分布特征、断层存在对地应力场的影响, 并在此基础上对断裂带的构造稳定性进行分析。研究表明, 断裂带的存在对地应力大小、方向、连续性、应力集中程度有明显影响; 局部位置存在塑性破坏区, 构造稳定性稍差, 存在进一步活动的趋势, 尤以F8, F9断裂北西段为甚。由于塑性破坏的发生会导致应力某种程度的释放, 从而使应力集中程度较低, 断层的活动将以蠕滑方式为主, 不足以形成中强地震。

**关键词** [数值分析](#); [罗湖断裂带](#); [三维地质模型](#); [有限元](#); [地应力场](#)

分类号

## ANALYSIS OF GEOSTRESS FIELD SIMULATION IN LUOHU FAULT ZONE WITH 3D FINITE ELEMENT METHOD

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### Abstract

Luohu Fault Zone is a part of Shenzhen—Wuhua Fault Zone and composed of 13 faults trending in NE direction and 6 faults trending in NW direction in the area of 38 km<sup>2</sup>, where faults are very dense. This fault zone is inside of Shenzhen City where many tall buildings locate, and F8, a fault of Luohu Fault Zone, is an active fault which acted in 1994. So it is very important to study the crustal stability of this fault zone. The geologic conditions of this zone are introduced firstly, then the 3D geological model is built and the numerical modeling of geostress field is finished with the elastoplastic finite element method. According to the modeling results, the characters of the geostress and the influence of the faults on the geostress field are expounded and the tectonic stability of the area is analyzed. The study shows that these faults have remarkable effect on the magnitude, direction, continuity and concentration degree of the geostress, and the tectonic stability in a few sites is bad because of the existence of plastic failure zone. It is very serious in the area which is be enclosed by F8, F13, F205 and F206, because the plastic failure can induce the stress relief and the decrease of the stress concentration degree, the main action manner

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of the faults is creeping slide and middle or strong earthquake will not happen.

**Key words** [numerical analysis](#); [Luohu Fault Zone](#); [3D geological model](#); [finite element](#); [geostress field](#)

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