

## CROSS-HOLE TOMOGRAPHY FOR URBAN UNDERGROUND KARST CAVE

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With the rapid development of urban subway projects, underground engineering accident accidents induced by bad geological bodies dominated by karst caves emerge constantly. This study mainly focuses on karst caves which are underground at depths of within 50m and can significantly affect engineering construction activity. In the characteristics of geophysical fields, karst caves are characterized by relative resistivity anomaly and wave impedance anomaly. Therefore, the resistivity method and elastic wave detection technology can be used for geophysical prospecting of karst caves. In the condition of urban complex shallow geological and complex construction environment, the conventional geophysical methods cannot meet the requirements of high-precision detection of small-scale, inhomogeneous complex geological bodies. The methods of cross-hole seismic tomography and cross-hole resistivity tomography are used for the detection of urban underground karst caves in this paper. The results show that the methods of cross-hole seismic tomography and cross-hole resistivity tomography can meet the requirements of fine imaging of inhomogeneous complex geological bodies; the karst cave shows a low velocity anomaly zone in the cross-hole seismic tomography; the karst cave can shows low resistivity characteristics ; karst caves with different fillings can present different resistivity characteristics ; an air filled karst cave shows higher resistivity characteristics than a slurry mixture filled karst cave, and this property will be helpful to interpret the filling property of karst caves; combined with the cross-hole seismic tomography and cross-hole resistivity tomography profile, the size, location and filling property of the karst cave can be well detected. This method carried out in 570 holes in the karst cave exploration of Hangzhou to Fuyang inter-city subway has achieved good results, and guided the construction safety of the project.