

BP神经网络在分岔隧道位移反分析中的应用

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摘要 在西部交通建设过程中, 沪蓉西宜昌—恩施段的高速工程穿过的多为崇山峻岭, 地形地质条件极为复杂, 遇到很多以前很少甚至从未涉及的难题。在隧道建设方面, 为适应多变的地形地质条件, 不仅设置连拱隧道、小间距隧道等多种型式, 而且还设置分岔隧道, 即一端洞口为连拱隧道甚至四车道大拱, 而另一端洞口为上下行分离隧道。利用沪蓉西八字岭分岔隧道现场监控量测数据, 结合有限差分程序FLAC3D与BP神经网络模拟技术, 对该分岔隧道围岩参数进行位移反演分析, 并考虑隧道围岩爆破松动圈的影响。工程应用结果表明, 该方法适用于求解这类大规模、复杂非线性隧道工程问题, 其稳定性、适用性良好, 精度满足工程要求。研究结果将对该隧道和西部山区类似的复杂结构长隧道的勘察、设计、施工起到一定的指导作用。

关键词 [隧道工程](#); [分岔隧道](#); [有限差分](#); [BP神经网络](#); [位移反分析](#)

分类号

APPLICATION OF BP NEURAL NETWORK TO BACK ANALYSIS OF FORKED TUNNEL DISPLACEMENT

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Abstract

In the construction process of west transportation, the section of Yichang—Enshi along Hurong expressway goes through many high and precipitous mountain areas, which induces many problems seldom or never met before. At the aspect of tunnel construction, to adapt to the varying and complex geological and topographic conditions, the forked tunnel together with double-arch, small-interval tunnel styles have been designed, that is, one entrance of the tunnel is four-driveway with big arch or double arches, and the other is apart double tunnels. Based on site monitoring data of the tunnel, the back analysis of forked tunnel displacement is well performed by combining the well-known finite difference program FLAC3D with BP neural network, considering the effects of broken and damaged zones. According to the results of engineering practice, it is revealed that this kind of back analysis method is capable to large-scale, complicated and nonlinear tunneling engineering, and is robust and practical enough to well meet the precision requirements of geotechnical engineering. Moreover, the results can be expected to be helpful and meaningful to reconnaissance, design and construction for not only the current studied one but also many similar complex and long tunnels in western China.

Key words [tunnelling engineering](#); [forked tunnel](#); [finite difference](#); [back-propagation neural network](#); [displacement](#)

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