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连拱隧道中隔墙设计与施工力学行为研究

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摘要　　在连拱隧道施工中，中隔墙扮演着至关重要的角色。中隔墙上方作用荷载大小，不仅关系着连拱隧道在施工期间结构的安全，还直接影响工程造价以及隧道建成后衬砌结构的长期安全性。结合连拱隧道施工期间中隔墙的实际受力过程，建立中隔墙作用荷载的计算力学模型；采用FLAC程序，在0.5～2.0D埋深条件下，采用三导洞法和中导洞法对连拱隧道施工力学过程的II～IV类围岩的21种工况进行非线性数值模拟。同时，提出应用于中隔墙设计的作用荷载计算表达式及各类围岩相适应的施工工法。研究结果直接指导金丽温高速公路二期工程多座连拱隧道的变更设计，对今后国内连拱隧道中隔墙的设计施工有一定的参考价值。

关键词　　隧道工程　连拱隧道　中隔墙　设计荷载　施工工法选择

分类号

STUDY ON MECHANICAL BEHAVIOURS OF DESIGNING AND CONSTRUCTION FOR CENTER PILLAR OF DOUBLE-ARCHED TUNNEL

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Abstract

During the construction of double-arched tunnel，the role of center pillar is of great importance. As a key load-bearing component in double-arched tunnel support，it will influence the stability and construction cost as well as long-term safety of double-arched tunnel. Therefore，the assumption of loads acting on center pillar is of an important consideration in structure design. Through the analysis of the loads acting on center pillar during double-arched tunnel construction procedure，the mechanical model for calculation of practical loads acting on center pillar is set up. By using FLAC，twenty-one kinds of cases for double-arched tunnel in surrounding rock masses with Classes II–IV are studied. The covering depths from 0.5D to 2.0D as well as the three construction methods consisting of three-drift and center-drift coupled with bench cut and full-face methods are considered. Based on analysis of the loaded characteristics of center pillar and magnitude changes of actual loads，the two estimation formulae of loads acting on the center pillar in place of the assumption of the total overburden load for design of center pillar structure are proposed. Furthermore，the optimum construction methods corresponding to the different classes of rock masses are recommended. The achieved results are successfully applied to the modification design of double-arched tunnels of Jinhua—Lishui—Wenzhou Expressway in East China. The results demonstrate that the assumption of proposed loads acting on center pillar is reasonable，and the optimum construction methods can save construction cost and shorten construction period of double-arched tunnel.

Key words　tunnelling engineering　double-arched tunnel　center pillar　design loads　selection of construction methods

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