

# 新型铁路隧道门洞口段结构受力特征现场试验研究

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**摘要** 现有的铁路隧道门洞的设计只是经验性地照搬标准图的模式, 而对新型隧道门的研究是必要的。一种新型隧道门在满足它的美学效果、环境保护等功能外, 更重要的是应保证隧道洞口结构受力后的安全性。对采用新型隧道门的洞口段围岩压力和衬砌内力进行现场测试, 并将单线斜切式隧道门洞口段的现场试验结果与模型试验和有限元数值计算结果进行比较, 探讨了洞口段围岩压力分布和衬砌结构受力特征。研究表明: 斜切式隧道门洞口段围岩压力和衬砌内力从洞口向洞内逐渐增大, 其大小随覆盖层厚度增大而增大, 围岩压力在仰拱处最大; 衬砌结构处于复杂的三维受力状态, 既有横向轴力、弯矩, 又有纵向轴力、弯矩, 其受力特征类似于壳体结构, 因此, 按壳体结构设计比较合理。

**关键词** [隧道工程; 铁路隧道; 新型隧道门; 现场试验; 结构受力特征](#)

分类号

## RESEARCH ON IN-SITU TEST OF MECHANICAL BEHAVIORS OF LINING IN NEW-STYLE RAILWAY TUNNEL PORTAL

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### Abstract

Railway tunnel portal is always designed according to the standard drawing with experience. Research on new-style tunnel portal is necessary. Besides a new-style tunnel portal should have aesthetic effect and be beneficial to protect environment, it should be ensured security of the structure. Surrounding rock pressure and mechanical behaviors of lining in the new-style tunnel portal had been tested in-situ. The distributed characters of surrounding rock pressure and mechanical behaviors of lining are discussed, by comparing the test results with model experiment and finite element analysis results. The results show that the surrounding rock pressure and internal force of lining increase from the tunnel entrance to inside in the bamboo-truncating tunnel portal. The value increases with the depth of cover. The pressure of surrounding rock is maximal at the invert arch. And the lining is in complicated three-dimensional mechanical state. There are not only circumferential axial force and bending moment but also longitudinal axial force and bending moment. The mechanical behaviors of lining are similar to those of shell structure. So it is reasonable to design lining for the tunnel portal as a shell structure.

**Key words** [tunneling engineering; railway tunnel; new-style tunnel portal; in-situ test; mechanical behaviors of lining](#)

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