

## 双线盾构越江隧道合理间距优化与分析

王伟<sup>1, 2</sup>, 夏才初<sup>1, 2</sup>, 朱合华<sup>1, 2</sup>, 范明星<sup>3</sup>

(1. 同济大学 岩土工程重点实验室, 上海 200092; 2. 同济大学 地下建筑与工程系, 上海 200092; 3. 上海市政二公司, 上海 200092)

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**摘要** 以上海复兴东路双线盾构越江隧道为背景, 利用Marc有限元软件, 通过建立盾构隧道江中段的三维弹塑性有限元模型, 对隧道不同间距的情况进行了模拟分析, 并着重研究后建隧道施工对先建隧道的影响, 得出了该隧道合理间距的建议值, 为隧道间距的优化设计提供了依据。然后在施工过程中对先建隧道的内力和变形及作用在先建隧道上的荷载等进行了监测, 并将监测结果与数值模拟的优化结果进行了比较分析, 验证了有限元模型的有限性。得出了一些有意义的结论, 对类似工程具有重要的参考价值。

**关键词** [隧道工程](#); [越江隧道](#); [盾构法](#); [优化设计](#); [合理间距](#); [相互影响](#)

分类号

## OPTIMIZATION AND ANALYSIS OF REASONABLE DISTANCE OF TWIN-TUBE RIVER-CROSSING SHIELD TUNNEL

WANG Wei<sup>1, 2</sup>, XIA Caichu<sup>1, 2</sup>, ZHU Hehua<sup>1, 2</sup>, FAN Mingxing<sup>3</sup>

(1. Key Laboratory of Geotechnical Engineering, Tongji University, Shanghai 200092, China; 2. Department of Geotechnical Engineering, School of Civil Engineering, Tongji University, Shanghai 200092, China; 3. Shanghai No.2 Municipal Engineering Co., Ltd., Shanghai 200092, China)

### Abstract

Crossing-river tunnel of Fuxingdong road in Shanghai City is the first twin-tube and double-layer tunnel in China. The full length of the project is 2 785 m and the outer diameter of tunnel lining structure is 11.22 m. Based on this tunnel, a 3D elastoplastic finite element model of twin-tube shield tunnel, which bears water pressure, was developed. The general software, Marc, is adopted to build the finite element model and simulate a 90 m long tunnel section, whose diameter is 11 m. Drucker-Prager material model is used as the strength criterion for soil. Soil mass in a same layer is considered as an isotropic body based on the geological condition that the soil is basically homogeneous, and is horizontal layered. In the modeling, water pressure is applied as load acting on the upper soil layer's surface of the model. Models simulating various circumstances with different tunnel distances are analyzed, on which the researches emphasizes the influence rules of subsequent tunnel to antecedent tunnel through analyzing the following indices: settlement of ground surface, axial force and moment of lining, soil pressure of lining and diameter deformation of different direction. Reasonable tunnel distance is drawn, which can be a reference to optimal design of similar projects. During the

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construction, the internal force of lining, soil pressure of lining and displacement of key issues of antecedent-building tunnel are monitored. To verify the validity of the finite element model, monitoring and computing results are compared and analyzed. The significant results obtained provide a better understanding of excavation process of twin-tube tunnel, and it is helpful in guiding future design and construction in similar conditions.

**Key words** [tunnelling engineering](#); [crossing-river tunnel](#); [shield method](#); [optimal design](#); [reasonable distance](#); [interaction](#)

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