

盾构隧道施工引起的地面变形计算方法研究

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摘要 假定土体不排水, 利用弹性力学的Mindlin解, 推导正面附加推力、盾壳与土体之间的摩擦力引起的地面变形计算公式; 提出土体损失引起的三维地面变形计算公式。将正面附加推力、摩擦力和土体损失引起的地面变形计算公式叠加, 得到盾构施工引起的地面变形计算公式, 该方法适用于施工阶段。算例分析表明, 该方法的计算结果与实测值相当吻合。盾构施工引起的纵向地面变形曲线呈“S”形; 隧道开挖面上方处轴线两侧的地面产生隆起现象; 在正常施工时, 盾壳与土体之间的摩擦力对地面变形的影响远大于正面附加推力。

关键词 [隧道工程](#); [盾构隧道](#); [地面变形](#); [正面附加推力](#); [摩擦力](#); [土体损失](#)

分类号

STUDY ON CALCULATION METHOD OF GROUND DEFORMATION INDUCED BY SHIELD TUNNEL CONSTRUCTION

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Abstract

Assuming soil was undrained, the computing formulae of ground deformation induced by both bulkhead additive thrust and friction force between shield and soil were derived from the Mindlin solution in elastic mechanics. Formula of ground deformation induced by ground loss was offered. Combining the formulae of ground deformation induced by ground loss, bulkhead additive thrust, and the friction force between shield and soil, the formula of total ground deformation induced by shield tunneling was obtained. This method was applied to the construction phase. As shown in analytical calculation, the calculated results were in accordance with the field data. Longitudinal surface deformation induced by shield tunnel was assumed as a S-shaped curve. Surfaces on both sides hunched up at the axis of excavation face. During normal construction process, the friction force between shield and soil exhibited greater influence on surface deformation compared with bulkhead additive thrust.

Key words [tunnelling engineering](#); [shield tunnel](#); [surface deformation](#); [bulkhead additive thrust](#); [friction force](#); [ground loss](#)

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