

论文

开采扰动河床防渗治理方法

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摘要:

以甘肃某煤矿在金沙河下开采为背景, 针对扰动河床防渗问题, 采用地表移动监测和离散元数值模拟, 揭示了开采扰动河床地表移动规律和地层破坏特征及渗流路径; 研究出能够协调和缓冲开采扰动河床变形的柔性“四元结构”防渗治理方案, 自下而上依次为: 加固层起提高河床强度、减轻因地下采动对河床的影响、增强河床整体性的作用; 防渗垫层预防河床错动和砾石对防渗层的折损, 同时可吸收部分河床局部变形; 防渗层是河床主要防渗结构, 由柔性和延展性俱佳的高强防渗土工膜制成; 防渗保护层具有固定和保护防渗层的功能。同时, 提出了扰动河道防渗治理的平、纵断面设计原则, 建立了扰动河床综合动态防渗体系。

关键词: 开采扰动; 河床; 防渗; 四元结构

Anti-seepage control method for mining disturbed riverbed

Abstract:

Based on the case of coal mining under Jinsha River in Gansu Province, and focused on the anti-seepage control of the mining disturbed riverbed, by making use of surface movement monitoring and discrete element numerical simulation, the study revealed the regularity of surface movement, the failure characteristics of strata and the percolation path induced by mining underneath the river. A flexible anti-seepage scheme, Four Element Structure(FES), was put forward, which can harmonize and buffer the mining induced deformation. From bottom to top, FES consists as follows: reinforcement layer plays the roles of strengthening the riverbed, buffering the deformation, and enhancing the riverbed integrity; bedding subgrade prevents the anti-seepage layer from folding damage due to dislocation and sharpness in riverbed, meanwhile, it can absorb localized deformation; anti-seepage layer is a main anti-seepage structure made by geomembrane with a high strength, good flexibility and ductility; protective layer has a function to fix and protect the anti-seepage layer. In addition, the design principles for the river path in plane, longitudinal and cross-sectional shape of the riverbed were established and a comprehensive mobilized seepage control system was put forward.

Keywords: mining disturbance; riverbed; anti-seepage; Four Element Structure

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