



煤矸石推剪试验的颗粒离散元细观模拟

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Mesomechanical Simulation of Push-Shear Tests on Coal Waste with Particle Flow Code

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摘要 以现场推剪试验为基础,基于二维颗粒离散元(two dimensional particle flow code,PFC^{2D})建立煤矸石推剪试验模型,通过不同级配和孔隙率反映治理前后不同密实度的矸石散粒体,较好地模拟煤矸石现场推剪试验的推力-位移曲线;对比分析治理前后推剪模型推力-位移曲线的差异性,从细观力学角度验证推剪试验中矸石颗粒的运动规律.颗粒离散元模拟结果表明:治理前后推剪模型都存在接触力沿滑裂面传递的现象;由于碾压作用,治理后推剪模型的接触力呈倒月牙形分布;治理后煤矸石试样在推剪完成后,其颗粒接触力与水平方向的夹角比治理前更大,集中分布区域更狭窄.通过颗粒位移矢量图确定推剪试验的滑裂面,解决了煤矸石推剪试验中滑裂面难以确定的问题.

关键词: [煤矸石](#) [颗粒离散元](#) [推剪试验](#) [滑裂面](#)

Abstract: Based on two dimensional particle flow code (PFC^{2D}), a horizontal push-shear test model of coal waste is established to simulate the push-shear tests that gangue have different compactness before and after improvement reflected by different gradation and porosity. The pushing force-displacement curves of the coal waste specimens are reproduced and verified by the PFC^{2D} model, and the difference in the curves is analyzed. The law of particle mobilization in push-shear tests is verified from the perspective of mesomechanics. The results show that the contact force in the model will transmit along the slip surface. Distribution of contact force after improvement presents inverted crescent-type. Furthermore, the angle between the direction of contact force and the horizontal in the model after improvement becomes larger, and the contact force concentrates in a narrower area. The slip surface is also determined in push-shear tests by means of the displacement vector chart.

Keywords: [coal waste](#), [particle flow code](#), [push-shear test](#), [slip surface](#)

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