

论文

纵轴式掘进机横摆运动参数的优化设计

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摘要:

建立了掘进机横摆过程中液压杆伸缩量与横摆速度之间的数学模型, 由单位能耗反求法推导出理论横摆速度, 并估算了其取值范围; 应用Matlab计算出不同横摆速度下的载荷曲线; 在多体动力学仿真软件ADAMS中建立了掘进机的刚柔耦合模型, 并对不同横摆速度及相应载荷下的模型进行动态仿真; 以掘进机生产率、回转台可靠性及寿命为约束条件, 对横摆速度进行优化。结果表明: 基于某工况, 在保证回转台可靠工作的前提下, 液压杆伸出速度为2.887 mm/s, 即横摆线速度为1.106 m/min时, 该型号掘进机能达到经济截割。

关键词: 掘进机; 回转台; 虚拟样机; 优化设计; 经济截割

Horizontal swing movement parameters optimization design of longitudinal road header

Abstract:

Mathematical model between hydraulic piston rod expansion capacity and horizontal swing velocity was built during the horizontal swing movement of the road header. Theoretical velocity was derived from unit energy consumption reverse method, and its value range was estimated. By using Matlab software, load curves of different horizontal swing velocities was calculated. The road header's rigid flexible coupling model was built in multi body dynamics simulation software ADAMS and dynamic simulations were done under different velocities and load cases. Take productivity of road header, reliability and lifetime of gyration platform as constraint conditions, the velocities of horizontal swing movement were optimized. The results show that on the premise of gyration platform working reliably, when the expansion speed of piston rod is 2.887 mm/s, namely horizontal swing velocity is 1.106 m/min, the road header gets the economical cutting.

Keywords: road header; gyration platform; virtual prototype; optimization design; economical cutting

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