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Direct Torque Control System for Belt Conveyor Based on Improved Genetic Algorithms	
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Abstract	The belt conveyor is the main transport equipments in coal field, and its controllable drive system directly impacts on the running safety reliability and cost in coal production. Starting speed is unsmoothed in the traditional electrical drive system, which causes the belt off tracking or split and even safety accident. Therefore it is theory and practical significant to introduce a novel direct torque control (DTC) system of AC machine to the belt conveyor for solving the problem in coal mine. In allusion to the optimization of PID parameters in the speed regulators of the belt conveyor, the paper presents the improved genetic algorithm based on genetic algorithms and taboo search for the design of variable parameters of PID controller, and its ability of stronger climbing and faster finding the global optimum results are verified through the De Jong function. Compared with the traditional means, the rise time of the suggested system is faster, overshoot and regulating time is shorter, anti-disturbance is stronger, robust is better. So the optimization performance of control system is improved greatly.
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Direct Torque Control System for Belt Conveyor Based on Improved Genetic Algorithms

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Abstract. The belt conveyor is the main transport equipments in coal field, and its controllable drive system directly impacts on the running safety reliability and cost in coal production. Starting speed is unsmoothed in the traditional electrical drive system, which causes the belt off tracking or split and even safety accident. Therefore it is theory and practical significant to introduce a novel direct torque control (DTC) system of AC machine to the belt conveyor for solving the problem in coal mine. In allusion to the optimization of PID parameters in the speed regulators of the belt conveyor, the paper presents the improved genetic algorithm based on genetic algorithms and taboo search for the design of variable parameters of PID controller, and its ability of stronger climbing and faster finding the global optimum results are verified through the De Jong function. Compared with the traditional means, the rise time of the suggested system is faster, overshoot and regulating time is shorter, anti-disturbance is stronger, robust is better. So the optimization performance of control system is improved greatly.

Introduction

The belt conveyor is a big Inertia load and a main transport vehicle in the coal mine safety production[1]. Because in the early the belt conveyer power was small and the transport distance was short, and the speed was low[2]. Its application was certainly limited. Along with electric power electronic technology and variable frequency modulation technology development, the belt conveyer technology had has been developed greatly, and it gradually becomes the most reliable and the most economical equipment in transportation bulk[3]. But there are still have some problems because the adhesive tape belongs to the flexible belt body. It requests the low and steady speed to start and it can not have the impact. Otherwise it is easy to break[4]. Moreover， it is easy to happen the phenomenon which the material rolls from the adhesive tape, so the belt conveyer's start acceleration generally must be controlled within 0.3m/s^2.

The improved heredity taboo algorithm is proposed in the direct torque control's foundation in this paper, which solves speed regulator PID parameter optimization in the mineral belt conveyer[5]. This algorithm has "climb the mountain" and seeks for the globally optimal solution quickly ability. The control system optimization performance is greatly enhanced by using this algorithm[6].