

Development of Self-Sustaining Improvement Material for a Mud Film of the Weathered Soil of Red Beds

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Abstract: Red beds are widely distributed in various regions of China. Adapting measures to adjust to local conditions and using nearby materials to ecologically protect slopes, mines, and other engineering projects are methods advocated by environmental protection. A mud film of the weathered soil of red beds with improved materials for insulation and entropy preservation is commonly used in engineering ecological protection, and its self-sustainability is an important indicator with which to measure the protective effect; however, most of the commonly used improvement materials in production have high concentrations of chemical substances and high costs, causing environmental pollution. In response to this issue, this study has developed four new composite improved materials using waste paper as raw material. The low temperature resistance ($-20\text{ }^{\circ}\text{C}$, $0\text{ }^{\circ}\text{C}$), high temperature resistance ($40\text{ }^{\circ}\text{C}$, $60\text{ }^{\circ}\text{C}$, and $80\text{ }^{\circ}\text{C}$), and recyclability (dry and wet cycle: zero, one, two, and three times) of the four materials were tested. Under the conditions of changing the addition amounts of four new self-developed composite materials (0 g, 10 g, 20 g, 30 g, 40 g, 50 g, 60 g, 70 g, 80 g, 90 g, and 100 g), experiments were conducted on the thin-layer property, corrosion resistance, and flexibility of the mud film of weathered soil of red beds, and they were compared with conventional materials studied by the team in the early stage. At the same time, outdoor on-site testing was conducted. The experimental results indicate that the self-developed new composite improvement material has a good improvement effect on the self-sustainability and ecological protection effect of the mud film of weathered soil of red beds. This article summarizes the improvement mechanism and control factors of self-developed new composite materials in the self-sustainability of the mud film of the weathered soil of red beds, improves the suitability of engineering ecological protection, and develops green and low-cost engineering ecological protection technology.

Keywords: weathered soil of red beds; mud film; self-sustaining; improved materials; prepare