



A Simulated Test Device and Method for Underground Engineering Geological Disasters

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Abstracts: There are many kinds of geological hazards in China, which are widely distributed and frequently active. The engineering geological hazards of underground tunnels are especially serious, and their prevention and control situation is very grim. The underground engineering geological hazards have the characteristics of sudden occurrence, unpredictable and dangerous, which are not easy for technicians to observe and students to master. Therefore, it is very important to develop an intuitive, convenient, economical and comprehensive simulation and simulation device for these hazards. At present, there are few researches on underground geological hazard test devices at home and abroad, and there are still some shortcomings. Zhang Xiao invented a three-dimensional physical model test monitoring device for geological engineering disaster control. This device can monitor the underground environment in real time and visualize the expression, study the interaction mechanism between slurry and rock mass, so as to control the occurrence of disaster accidents such as water inrush and mud inrush. However, the device can only be used in the case of water inrush and mud inrush, which is a kind of underground engineering geological disaster. The object of application is relatively single, and its formation mechanism can not be directly simulated. Sun Keguo invented a passive prevention and control equipment for rock burst geological hazards in underground engineering and its application method, which can solve the safety accident caused by instantaneous release of accumulated energy in rock mass due to the insufficient energy absorption intensity of support system of underground engineering when high-strength rock burst occurs, and reduce rock burst hazards. However, the equipment can only be used passively to prevent and control geological disasters, with high cost, no reuse, no predictability and high risk. In order to facilitate the relevant personnel to grasp the difficulties in underground geological hazards, a simulation device and method for underground engineering geological hazards are developed. This test device is mainly composed of four parts: test box, settlement trough simulating land subsidence, movable gypsum block simulating excavation effect of tunnel engineering and vibration control device. It can not only be operated indoors, but also has advantages of low cost, simple operation, strong visualization and multifunctional. When demonstrating the geological hazards

of underground engineering, we can clearly observe the deformation, displacement, sliding, land subsidence, surface subsidence and water inrush and mud inrush of rock and soil mass under the coupling conditions of excavation effect, horizontal seismic effect and vertical seismic effect of underground engineering, and comprehensively show the formation mechanism of geological hazards of underground engineering. This simulation test device is pioneering in demonstrating and simulating the formation process, occurrence mechanism and phenomena of common geological hazards in underground engineering construction, systematically and comprehensively demonstrating the destruction mechanism of underground engineering geological hazards, providing an intuitive basis for the prevention and control of these hazards, so as to find the corresponding prevention and control measures and reduce the potential safety hazards in practical projects. Experiments show that the device is highly simulated, comprehensive and convenient for natural disasters and geological disasters. It is of great significance not only for college students majoring in related disciplines to learn and master the formation mechanism of underground engineering geological disasters, but also for technicians to put forward measures to prevent and control geological disasters.

Key words: underground engineering, geologic hazards, simulated test device

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