Brief Introduction of Content

With the acceleration of urbanization and industrialization, the problem of environmental pollution has become increasingly prominent, and the impact of a large number of engineering construction and resource development on the ecology needs to be resolved. The tailings pond is a man-made dangerous source of debris flow with high potential energy and high pollution. For many years, due to various natural and artificial factors, the tragic accident of the tailings pond dam has occurred, giving the downstream residents life and property safety belts. The huge threats are causing serious pollution to the surrounding environment. The pollution of the environment is irreversible. The damage caused by the dam break of the tailings pond is the most serious, the most widespread and the most costly accident in all mineral accidents. For such low-probability, high-hazard accidents, it is necessary to study the flow characteristics of the tailings reservoir dam slurry. For this reason, this monograph is mainly the research results of two aspects:

Firstly, based on Gambit software, a physical model is built and imported into the 3D Fluent computational fluid software. Based on the N-S equation, the standard k-ε turbulence equation is a closed model. The mortar formed by tailings and water liquefaction conforms to the Bingham model in non-Newtonian fluids. The VOF model that can track the free surface in multiphase flow is used for simulation, the study was conducted on

the dam break mode of tailings accumulation dam and the sand flow migration law of dam break, and the influence scope of dam break tailings on the downstream was predicted. The main research results were as follows: 1) Analyze the applicability of each rheological equation for the mechanism of tailings reservoir dam failure, and summarize the empirical formulas related to dam breakout tailings mortar, and provide theoretical basis for numerical simulation. 2) Using the three-dimensional model of Fluent, combined with the engineering data of a tailings pond in Yunnan, establish a simplified model, carry out simulation calculation, and obtain data for analysis and processing. The submerged range, stacking thickness, venting volume, maximum flow rate and flow rate after dam failure are analyzed. The flow characteristics prove the feasibility and practicability of Fluent software to simulate tailings dam failure. 3) Establish different tailings parameters according to different tailings physical characteristics, analyze the submerged range, stacking thickness, discharge volume, maximum flow rate and flow rate under different parameters to determine the role of parameters in the process of tailings mortar evolution. It is concluded that the plastic viscosity is the amount of the controlled discharge volume, and the roughness is an important parameter for controlling the submerged range and controlling the impact force.

Second, taking the seepage and stability analysis of a high tailings dam in Yunnan province as the engineering case, the seepage analysis and stability analysis of the tailings dam under the combination of static and static forces were carried out, and

the methods of seepage and stability analysis of the high tailings dam and the guiding significance of engineering design were given.

Keywords: Tailings Pond, Dam Break, Numerical Simulation, Bingham Model, Tailings Mortar