Research on 3D Geological Modeling of the North No. 10 Mining Area in Jiangzhuang Coal Mine, Shandong Province, China

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Abstract

In the North No. 10 Mining Area of Jiangzhuang Coal Mine, Shandong Province, leveraging the data from 58 boreholes and the outcomes of 3D seismic exploration, and predicated on the SKUA-GOCAD modeling platform, a novel generation of modeling technique known as “UVT coordinate transformation” was employed. This enabled the construction of the principal mining coal seams, limestone formations, geological structures, as well as the stratigraphic framework within the study area. Concurrently, the spatial configurational relationships of faults in the roof and floor of the coal seams and the limestone layers were established. By capitalizing on the geological section results and lithological data procured from boreholes, spatial predictions regarding the lithology, interburden gangue, and limestone within the study area were accomplished. Grounded on the engineering data, triangular mesh technology was harnessed to actualize the 3D visualization of working faces and roadways in the study region. Thereby, a suite of 3D geological modeling procedures, befitting the geological traits and data circumstances of the study area, was formulated. The research findings offer a quantitative and 3D visualizable manifestation of the intricate 3D spatial correlations among strata, coal seams, and structures in the mining and excavation undertakings across diverse horizons in the North No. 10 Mining Area of Jiangzhuang Coal Mine, thus facilitating the intelligent development of Jiangzhuang Coal Mine.

Keywords

3D Geological Modeling, Structural and Stratigraphic Model, Coal Seam, Engineering Roadway, Transparent Working Face