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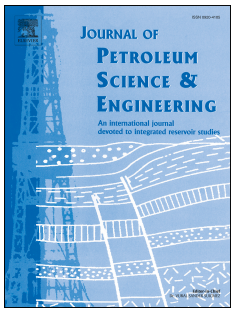

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Similarity Simulation of Mining-Crack-Evolution Characteristics of Overburden Strata in Deep Coal Mining with Large Dip

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Abstract: Figuring out the mining-crack-evolution characteristics of overburden strata is very important to roof control, gas drainage, disaster prevention and high efficient mining. In order to obtain the mining-crack-evolution characteristics of overburden strata in deep coal mining with large dip, in this study, No.1221 coal mining face of Zhao coal mine is chosen as the research object to establish an in-house experiment system of similarity simulation. The experiments could measure the stress and displacement of overburden strata, which can provide useful information to investigate the mining-crack-evolution characteristics, displacement variations and movement characteristics of overburden strata associated the coal mining face. Experimental results show that with the advancing of coal mining face, the scope of gob increases gradually, and formation of the false roof of overburden strata basically reflects the evolution process of collapsing. The overburden strata weight is constantly transferred to the front and rear of coal mining face, which forms the supporting pressures on both sides of coal pillars, and causes the gangue's collapsing in gob. The large dip of coal seam results in pressure disequilibrium in stress-increasing zone. Thus, the stress on the underside of gob becomes larger and larger, while the stress on upper side of gob decreases. The strata separation appears in the overburden strata of roof. Pressure-relief zone is mainly concentrated in the side of outlet roadway. Along the inclination direction of coal mining face, the crack development and strata separation are obvious, which create the passages for gas flow and migration. The similarity simulation results provide fundamental information for better understanding those mining-crack-evolution characteristics of overburden strata, which has become more and more important to control the roadway stability in coal mining and optimize the layout of gas drainage boreholes for improving