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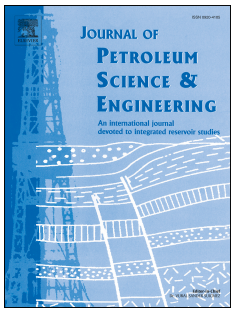

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Study on Hydraulic-controlled Blasting Technology for Pressure Relief and Permeability Improvement in a Deep Hole

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Abstract: The permeability of a coal seam is an important index of gas drainage. To improve the gas drainage effect of a coal seam with high gas content and low permeability, hydraulic-controlled blasting of a deep hole was carried out to provide pressure relief and to increase the permeability of a coal seam. The mechanism for pressure relief and permeability improvement caused by the hydraulic- controlled blasting was then analyzed. It was found that the outcomes were the result of joint action by the blasting force and the hydraulic pressure. The mechanism availably combines and exerts the advantages of both the blast force and hydraulic pressure. Based on the geological conditions, the 205 coal mining face of the 2nd coal seam in Yian coal mine was selected for this research. A numerical model of hydraulic-controlled blasting was established, and the spacing distance of the blasting holes and the effective radius of the blasting were numerically simulated using ANSYS/LS-DYNA software. The results of the simulation showed that the spacing distance between the control holes should be approximately 2.5 m, the effective blasting radius should be approximately 4.5 m. Therefore, the spacing distance between blasting holes should be less than 9 m. Hydraulic-controlled blasting technology of a deep hole was performed in the 205 coal mining face. The gas drainage flow, change in gas pressure, permeability coefficient and gas drainage time were measured at the blasting borehole and control boreholes. The results of engineering practice show that the technology can connect boreholes with each other through fractures, effectively discharge coal seam gas, effectively release gas pressure, greatly improve the permeability of the coal seam and reduce gas drainage time. The technology can effectively achieve the goals of