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Temperature evolution law of mining coal seam in gas desorption process

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In order to study the influence of coal desorption of gas heat effect and non-uniform boundary load on the temperature evolution law of coal and gas protrusion gestation process, we constructed the coal and gas heat-fluid-solid coupling model containing desorption of heat and carried out numerical simulation research. The study shows that: when considering the effect of desorption heat, the temperature changes in the stress elevation area, stress concentration area and stress unloading area have obvious stage changes, which can be divided into the pre-growth period, the middle period and the late period according to the rule of change. However, when the desorption heat effect is not considered, only the early and late stages of incubation exist; the effect of desorption heat promotes the temperature reduction of the coal body close to the working face, and inhibits the temperature reduction of the coal body far away from the working face; the non-uniform loading causes the temperature evolution of coal and gas protrusion process. The non-uniform loading causes the temperature in the stress concentration area of the coal seam to increase, and the value increases with the increase of the peak stress coefficient; the temperature drop of the coal seam decreases with the increase of the peak stress coefficient; heat convection and heat conduction are the main modes of temperature transfer in the coal seam; the non-uniform loading causes the pore space of the coal seam to be tightly closed, so that the process of heat convection is blocked, while heat conduction is not easy to be affected. The results of the study clearly understand the influence of heat-absorption effect on the temperature of coal seams under the influence of mining stress, explain the reasons for the temperature changes in different stress zones of coal seams, and provide a reference for the research in the area of early warning of coal and gas protrusion.

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