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论文

煤层气井产气通道内煤粉运动特征分析

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摘要:

基于脱落煤粉滚动启动条件和运移,建立了煤粉脱落、运移和堵塞的孔隙度和渗透率模型;分析了煤粉排出量对煤层孔隙度和渗透率的影响。依据该渗透率模型,研究煤粉适度排出理论,建立煤粉适度排出模型和携煤粉地层液速度窗口模型,使脱落的煤粉适度排出,疏通渗流通道,增加渗透率提高单井产气量。结果表明:煤粉的脱落增加了煤层的孔隙度和渗透率,而煤粉的沉积堵塞减少了煤层的孔隙度和渗透率;渗透率随煤粉的排出量的增加呈二次关系增大,煤层排出脱落煤粉可在一定程度上改善储层物性,提高煤储层的孔隙度和渗透率;采取压裂增产的煤层气井支撑剂粒径为20/40目正排列时,通过的最大煤粉粒径为0.16 mm,排液量大于13.53 m³/d有利于粒径小于0.1 mm脱落的煤粉排出,最大限度地提高煤层渗透率,增加煤层气单井产气量。

关键词: 煤层气井;煤粉;适度排煤粉;地层液流速

Calculation on discharge flow of pulverized coal in gas production channel for coalbed methane well

Abstract:

Based on the moving off conditions of pulverized coal and the suspended migration conditions coal particles, a porosity and permeability model regarding pulverized coal fall off, migration and blockage was developed in this study, which was used to study the influence of porosity and permeability from the discharge amount of pulverized coal. According to the model, and the theory of pulverized coal proper discharge, the pulverized coal proper discharge model and the critical fluid speed coal model were established. Once the fall off of coal powder is discharged, and the seepage channel is dredged, subsequently, the permeability and gas production are increased. The results show that the porosity and permeability of coal seam are improved by peeling of pulverized coal, and are reduced by the sedimentary and jam of peeled pulverized coal; if the fall off coal powder is not removed, the porosity and permeability of coal seam will not change. If the fall off coal powder moves near wellbore and no reduction, the coal seam porosity and permeability will unchange, however, the porosity and permeability away from wellbore will increase, and the porosity and permeability near wellbore will decrease. Because of the permeability reduction, the overall gas production is affected. The permeability increase follows a quadratic relationship with the amount of pulverized coal discharge. When the support particle size is 20/40 in the stimulation of coalbed methane well, the largest discharge coal particle size is 0.16 mm. When liquid output volume is 13.53 m³/d, it is good for discharging the pulverized coal with a size smaller than 0.1 mm, which improves the permeability of coal seam, and increases the coalbed methane gas production.

Keywords: coalbed methane well; pulverized coal; producing with limited pulverized coal; fluid flow velocity

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