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论文

煤层气井煤粉颗粒表观机械运移规律

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摘要:

煤粉颗粒在煤层气井的排采过程中会随着流体运移至井筒, 研究煤粉颗粒在井筒中的运移规律, 对于优化排采参数、避免煤粉在井筒内沉积甚至埋泵非常必要。自行设计了煤粉颗粒运移实验装置, 开展了煤粉颗粒静态沉降实验和动态运移实验, 得到了煤粉颗粒静态沉降末速和最小携带速度。结合球形颗粒自由沉降末速的理论计算公式, 建立了煤粉颗粒实际沉降末速的计算模型, 并确定了不同目数煤粉颗粒的最小携带速度与实际沉降末速间的关系, 最终建立了煤层气井最小日排水量的计算公式。研究表明, 对于产水量较小的井, 流体携带煤粉颗粒的能力与煤粉颗粒的粒径、井筒内流体流速间的关系敏感, 本文提出的最小排水量计算公式对于煤层气井的排采参数设计具有一定的指导作用。

关键词: 煤层气井; 井筒; 煤粉颗粒; 运移规律

Superficial transport mechanisms of coal particles in the coal-bed methane well

Abstract:

It is important to study the apparent transport mechanisms of coal particles in the wellbore, which is crucial in terms of optimization design, avoiding coal particle setting and coal burying pump in some extreme cases. Coal particles settling and transport experiments were conducted to investigate the static settling velocity and minimum entrainment velocity using the self-designed coal particle migration testing device. Based on theoretical terminal velocity models of spherical liquid drops, calculation model of actual settling velocity of different mesh of coal particles were established, which incorporated experimental data. As a result, a formula predicting minimum water production rate for a CBM well is established too. In conclusion, parameters, like diameters of particles, velocity of fluids are high sensitive or have a huge effect on coal carrying capacity of fluids, and the minimum water production rate formula presented is helpful in providing insight in optimization unloading design of a CBM well.

Keywords: coal-bed methane well; wellbore; coal particles; transport mechanisms

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