煤炭学报 2014, 39(04) 593-599 DOI: ISSN: 0253-9993 CN: 11-2190



论文

# 考虑应力敏感性的煤层气井产能模型及应用分析

孟召平，张纪星，刘贺，刘珊珊，周晓得

1.中国矿业大学（北京） 地球科学与测绘工程学院，北京 100083；
2.三峡大学 三峡库区地质灾害教育部重点实验室，湖北 宜昌 443002

摘要：

煤储层应力敏感性是影响煤层气井产能的地质因素，在煤层气井排采过程中如何降低或避免煤储层应力敏感性对煤层气井产量的影响是值得考虑的问题。在对煤储层应力敏感性分析的基础上，推导了考虑应力敏感性的煤层气气井产能模型，提出了用产量降低幅度值（β）描述应力敏感性对煤层气井产量的影响程度，揭示了有效应力对煤储层渗透性和煤层气井产能的影响规律。研究结果表明：煤储层渗透率随有效应力的增加按负指数函数规律降低，在煤层气开发中煤储层表现出明显的应力敏感性。考虑煤储层应力敏感性后，煤层气井的产量低于不考虑应力敏感性的气井产量；随生产压差的增大，煤层气井的产量增加幅度较小，并逐渐趋向稳定，且煤层气井产量下降幅度β值增大；煤层气井的产量降低幅度β值随应力敏感系数的增大整体呈增高趋势。随着生产压差的增加，煤层气井的产量增加幅度较小，并逐渐趋向稳定，说明放大生产压差并不能获得最大产量，煤层气开发需要制定合理的生产压差和严格控制排采强度。

关键词： 煤储层；应力敏感性；煤层气井；产能模型

## Productivity model of CBM wells considering the stress sensitivity and its application analysis

Abstract:

The stress sensitivity of the coal reservoir is one of the geological factors affecting the productivity of CBM wells，how to reduce or avoid effect of the stress sensitivity on CBM well production is a question worth considering in CBM wells production process.Through the analysis of the stress sensitivity of coal reservoir，the productivity model of CBM wells considering the permeability stress sensitivity was deduced，then the yield reduced the magnitude of value(β) was put forward to describe the influence degree of the stress sensitivity on the productivity of CBM wells，and the impact of the effective stress on the permeability of coal reservoir and the effect law of CBM wells productivity were finally revealed.Research results show that the permeability of coal reservoir reduces with the effective pressure increases by the negative exponential law and coal reservoir shows obvious stress sensitivity during the development of CBM wells.The productivity of CBM wells which consider the stress sensitivity of the coal reservoir is lower than that don’t.With the producing differential pressure increases，CBM wells productivity increases significantly，and gradually tend to be stable，and the yield reduced the magnitude of value(β) increases meanwhile.The value(β) should be the overall increased with increasing the stress sensitive coefficient of coal reservoir.The production of CBM well increases to a lesser extent with the pressure difference increases and gradually tend to be stable.Enlarging the production pressure difference can not get the maximum yield.Therefore CBM development need to be draw up a reasonable production pressure difference and strictly control the production intensity.

Keywords: coal reservoir；stress sensitivity；CBM wells；productivity model

收稿日期 2013-12-04 修回日期 2014-02-12 网络版发布日期 2014-04-22

DOI:

基金项目:

国家自然科学基金资助项目(41372163，41172145)；国家重点基础研究发展计划(973)资助项目(2012CB214705)

通讯作者: 孟召平

作者简介: 孟召平(1963—)，男，湖南汨罗人，教授，博士生导师，博士

作者Email: mzp@cumtb.edu.cn

参考文献：

本刊中的类似文章