高含CO_2气井产能计算新方法

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A new method of productivity prediction for high CO_2-content gas wells

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摘要 松南火山岩气藏高含CO_2,这种气体的存在对天然气的高压物性产生很大影响,使得气井产能预测与实际相差较大。在高含CO_2气体高压物性分析(PVT)实验的基础上,研究了温度、压力和CO_2含量对天然气高压物性参数的影响规律,建立了不同CO_2含量下天然气粘度和偏差因子与压力的相关关系,并结合气体渗流理论建立了考虑高含CO_2天然气高压物性变化的产能预测新模型。实例计算表明:①气井产能随着CO_2含量的增高而降低;②当CO_2含量大于20%时,气井产能评价必须考虑μZ值(天然气粘度与偏差因子的乘积)变化的影响;③开发中后期可以忽略CO_2含量对气井产能的影响。新的产能计算方法能反映CO_2含量对产能计算的影响,精确度更高,对于高含CO_2天然气田的产能评价和生产制度的制定具有重要的指导意义。

关键词： 产能　气井　CO_2含量　天然气　松辽盆地

Abstract： Productivity of gas wells in Songnan volcanic gas reservoir is difficult to predict as high CO_2 content has great influences on PVT of natural gas,resulting in large difference between the measured and predicted productivity.Based on laboratory experiments,this paper studied the effects of temperature,pressure and CO_2 content on PVT of gas with high CO_2 content and established the relational expressions of gas viscosity and Z-facto to pressure for gas with different CO_2 contents.A new prediction model considering PVT variations of gas with high CO_2 content was built based on gas percolation theory.The case study results indicate that the productivity reduces with the CO_2 content increasing;the effect of μZ factor changes on productivity prediction should be considered when CO_2 content is above 20%;and the impacts of CO_2 content on productivity lowers to a level that can be neglect in late production period.The new method is accurate and practical for the high CO_2-content gas reservoirs.

Keywords： productivity　gas well　CO_2 content　natural gas　Songliao Basin

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