盐穴储气库腔体收缩风险影响因素的敏感性分析

井文君1，杨春和1，2，李鲁明3，元震宇3，施锡林1，李银平1*

(1. 中国科学院武汉岩土力学研究所 岩土力学与工程国家重点实验室，湖北 武汉 430071；2. 重庆大学 西南资源开发及环境灾害控制工程教育部重点实验室，重庆 400044；3. 中国石油化工股份有限公司天然气川气东送管道分公司 金坛储气库项目部，江苏 金坛 213200)

SENSITIVITY ANALYSIS OF INFLUENCE FACTORS OF CAVERN SHRINKAGE RISK IN SALT CAVERN GAS STORAGES

JING Wenjun1，YANG Chunhe1，2，LI Luming3，YUAN Zhenyu3，SHI Xilin1，LI Yinping1*

(1. State Key Laboratory of Geomechanics and Geotechnical Engineering，Institute of Rock and Soil Mechanics，Chinese Academy of Sciences，Wuhan，Hubei 430071，China；2. Key Laboratory for Exploitation of Southwestern Resources and Environmental Disaster Control Engineering，Ministry of Education，Chongqing University，Chongqing 400044，China；3. Jintan Gas Storage Project Department，Sichuan-to-East Natural Gas Transmission Pipeline Branch Company of SINOPEC，Jintan，Jiangsu 213200，China)

摘要 参考文献 相关文章

Download: PDF (227KB) HTML 1KB Export: BibTeX or EndNote (RIS) Supporting Info

摘要 如何有效减少盐穴储气库在运营过程中的有效体积损失以延长储气库的使用寿命是运营和管理部门非常关心的问题。从宏观角度分析腔体的地层、设计和运行各参数对我国盐穴储气库腔体收缩风险的影响，归纳出7个可能影响因素并分别对其影响趋势进行预测，然后采用单因素敏感性分析方法，通过数值模拟计算结果的对比分析得到这7个可能影响因素对腔体体积收缩率的敏感度系数，并基于运行工况因素的敏感性系数值，提出盐穴储气库在运营过程中运行工况发生变化时腔体年体积收缩率的预测方法。结果表明除了盐岩本身的蠕变特性参数，从宏观角度分析，相邻腔体运行模式、单周期内低压运行时间比例和腔体高径比是盐穴储气库腔体收缩风险的敏感因素。因此，在腔体的建设和运营过程中，采用邻近腔体同采同注的运行模式，尽量减少低压运行时间，同时合理控制腔体的成腔形状，可以有效控制腔体的体积收缩变形。

关键词： 数值分析 盐穴储气库 腔体收缩 影响因素 敏感性分析 体积收缩预测

Abstract： How to decrease the effective volume loss of salt cavern gas storages during their operation period to increase their service life is the concerned problem of operation and management departments. The influence of formation parameters，design parameters and operation parameters on cavern shrinkage risk of salt cavern gas storages was analyzed from the macroscopic angle. The inductive seven factors were analyzed and forecasted aiming at their effects on volume shrinkage of salt cavern gas storages. Then，the single-parameter sensitivity analysis method was used to calculate the seven factors? sensitivity coefficients to volume shrinkage ratio. Finally，a new method of forecasting the cavern?s volume shrinkage ratio was put forward based on the factors? sensitivity coefficient when the operation parameters were changed. The following conclusions are drawn. Besides the creep parameters of salt rock，the running mode of neighboring caverns，low pressure runtime in a cycle period and ratio of height to diameter of cavern are the sensitive factors for cavern shrinkage risk. Therefore，the cavern shrinkage can be decreased effectively by injecting and producing simultaneously with neighboring caverns，reducing low pressure runtime and controlling the cavern shape during construction and operation periods.

Keywords： numerical analysis salt cavern gas storages cavern shrinkage influence factors sensitivity analysis prediction of volume shrinkage

Received 2012-04-27;

引用本文:

井文君1，杨春和1，2，李鲁明3，元震宇3，施锡林1，李银平1.盐穴储气库腔体收缩风险影响因素的敏感性分析[J] 岩石力学与工程学报, 2012,V31(9): 1804-1812

JING Wenjun1，YANG Chunhe1，2，LI Luming3，YUAN Zhenyu3，SHI Xilin1，LI Yinping1.SENSITIVITY ANALYSIS OF INFLUENCE FACTORS OF CAVERN SHRINKAGE RISK IN SALT CAVERN GAS STORAGES[J] ，2012,V31(9): 1804-1812

Service
把本文推荐给朋友
加入我的书架
加入引用管理器
Email Alert
RSS
作者相关文章

Copyright 2010 by 岩石力学与工程学报