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CLYJ 饱水石灰岩骨架和流体弹性参数估算

牛滨华¹, 郭继亮¹, 孙春岩², 邹荃¹, 贾冀辉¹, 刘畅¹, 杨维¹, 许福萍^{1*}

1. 中国地质大学(北京)地球物理与信息技术学院, 北京 100083;
2. 中国地质大学(北京)工程技术学院, 北京 100083

Estimating elastic parameters of framework and pore fluid from CLYJ saturated limestone samples

NIU Bin-Hua¹, GUO Ji-Liang¹, SUN Chun-Yan², ZOU Quan¹, JIA Ji-Hui¹, LIU Chang¹, YANG Wei¹, XU Fu-Ping^{1*}

1. School of Geophysics and Information Technology, China University of Geosciences (Beijing), Beijing 100083, China;
2. School of Engineering and Technology, China University of Geosciences (Beijing), Beijing 100083, China

摘要

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摘要 文章结合CLYJ饱水石灰岩数据案例,开展以反演为主的数值计算分析研究.运用样品测试的整体密度和纵横波速度数据,采用合理有效的反演方法,求取骨架和流体组分弹性参数的估计数据.在完成样品数据准备和模型方程选定后,进行组分弹性参数估计.方法包含样品分组、回归分析、统计分析和结果对比评估.首先是样品分组,分组方式可分为整体和个体两种方式.然后用模型方程转化成的回归方程,对每组样品进行回归分析得到回归结果.再后是统计分析,就是对所有组的回归结果进行统计分析,并得到每个弹性参数的估计数据.最后,通过分析估计数据等统计性指标参数,以及测试数据和估计数据正演结果的相关系数,评价估计数据的可信度和可靠性.研究结果表明,求取样品骨架和流体组分弹性参数估计数据的方法可行有效,结果可信可靠.所求估计数据从组分层面表述了CLYJ饱水石灰岩的弹性性质,丰富了样品案例的数据内容.

关键词: CLYJ样品数据 样品分组、回归分析和统计分析 骨架和流体弹性参数

Abstract: In this paper, the numerical method dominated by inversion is used to analyze CLYJ saturated limestone samples. Elastic parameters of rock framework and pore fluid are estimated from the overall measured density and velocity data with different porosities based on the effective inversion method. The critical porosity model is used, and elastic parameters are calculated after grouping samples. The estimating process includes grouping, calculating, counting and evaluating. Firstly, three samples are chosen as a group and there are N different ways to group. The samples are grouped in both the integral way and individual way. Secondly, for each group the component elastic parameters are calculated based on the critical porosity model and N groups of results are obtained. Then, the results are analyzed to estimate the elastic parameters of samples. At last, the results are evaluated through comparisons of statistic parameters between the estimated values and measured ones, such as maximum, minimum, mean, and standard deviation. The results indicate that the method to estimate the elastic parameter of rock framework and pore fluid is effective and reliable. The component elastic parameters reflect the elastic properties of CLYJ limestone samples, and enrich the contents of the samples.

Keywords: CLYJ limestone sample Grouping inversion and statistic Elastic parameter of framework and pore fluid

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Corresponding Authors: 郭继亮,男,1983年生,博士研究生.目前从事孔隙介质地震波传播和岩石物理方向研究.E-mail: geophysics.china@gmail.com Email: geophysics.china@gmail.com

About author: 牛滨华,男,1952~2010,博士.曾为中国地质大学地球物理与信息技术学院教授,多年从事地球物理教学与科研工作;曾为中国地球物理学会终生会员,中国地质学会会员,SEG Active Member

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