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核磁共振 $T_2$ 谱转换伪毛管压力曲线的矩阵方法

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Matrix Method of Transforming NMR  $T_2$  Spectrum to Pseudo Capillary Pressure Curve

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PDF (PC)

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摘要/Abstract

摘要 :

针对核磁共振 $T_2$ 谱转换伪毛管压力曲线的常规方法仅是将 $T_2$ 值转换成毛管压力值,从而造成了伪毛管压力曲线转换精度和实用性方面的不足。基于线性变换的概念,提出了从整体上进行转换的矩阵方法。按数据处理方式的不同,给出平均矩阵法、一次矩阵法和坐标矩阵法等3种算法。将10块岩心分成2组:一组8块用于建立转换矩阵;另一组2块用于检验转换效果。结果表明,3种算法转换的伪毛管压力曲线与压汞毛管压力曲线形态一致,符合精度较高|平均矩阵法、一次矩阵法和坐标矩阵法的最大均方误差分别为0.014 4、0.001 9和0.009 1,一次矩阵法的转换效率、可靠性和准确度总体上高于平均矩阵法和坐标矩阵法。核磁共振 $T_2$ 谱转换伪毛管压力曲线的矩阵方法效果良好,具有实用价值。

**关键词:** 核磁共振,  $T_2$ 谱, 转换矩阵, 压汞毛管压力曲线, 伪毛管压力曲线

**Abstract:**

For the methods of transforming NMR  $T_2$  spectrum to pseudo capillary pressure curve only have one coefficient,so the results are deficient in both accuracy and practicability.Matrix method which finishes transformation taking NMR  $T_2$  spectrum and pseudo capillary pressure curve as a whole is proposed based on linear transformation.According to different data processing way,average matrix algorithm,one-time matrix algorithm and coordinate matrix algorithm are given.Dividing the 10 cores into two parts,one part containing 8 cores is to establish transformation matrix,the other part containing 2 cores is to inspect the effect of transformation.The results show that the pseudo capillary pressure curves obtained from three algorithms agree well to the mercury injection capillary pressure curves: the maximum mean square error of the three algorithms is 0.014 4,0.001 9,0.009 1,respectively.As a result,the theoretical basis of the matrix method of transforming NMR  $T_2$  spectrum to pseudo capillary pressure curve is solid,the algorithms are reasonable,effect of transformation is good,and the method has practical value.The efficiency,reliability and accuracy of transformation of one-time matrix algorithm are better than that of average matrix algorithm and coordinate matrix algorithm.

**Key words:** NMR,  $T_2$  spectrum, Transformation matrix, Mercury injection capillary pressure curve, Pseudo capillary pressure curve

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