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六种不同煤阶煤的品质因子特征

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Quality factor characteristics of six metamorphic kinds of coals

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摘要

通过6种不同煤阶煤的弹性测试，分析了煤岩变质程度（以镜质组最大反射率表示）与煤岩品质因子之间的关系；在此基础上，进一步分析了煤岩速度与品质因子之间的关系及纵波与横波品质因子的各向异性特征.研究发现：煤岩镜质组最大反射率与纵波、横波品质因子均存在良好的线性相关性；垂直层理方向的波速与品质因子存在良好的线性关系，好于走向与倾向方向；垂直层理方向的纵波与横波品质因子线性相关，相关系数可达93.5%；煤岩的三方向品质因子存在各向异性，且强于速度的各向异性.通过横波品质因子与纵波品质因子间相互换算的理论公式计算结果与实验室实测结果的对比，证明了该理论公式的可靠性，误差小于10%，为多分量转换波的吸收衰减补偿提供了理论依据.

关键词　煤岩，镜质组反射率，品质因子，各向异性，衰减补偿

Abstract：

Lab ultrasonic measurements to metamorphic kinds of coal reveal the relationship between maximum vitrinite reflectance and ultrasonic quality factor. And then the relations between ultrasonic velocities and quality factors, including the anisotropic characteristics of quality factors are analyzed. The results show that there are a good linear correlation between the maximum vitrinite reflectance and P-and S-wave quality factor, quality factors and velocities in vertical direction, the P-wave quality factor and S-wave's in vertical direction. Moreover, there are stronger anisotropies in seismic quality factors than velocities. Comparison of the measured S-wave Q values with estimated values based on a theoretical formula indicates an only 7.2% relative error in this method. It proves that this theoretical formula can be applied to attenuation compensation of the converted shear wave in processing of multi-component seismic data.

Keywords Coal, Vitrinite reflectance, Quality factor, Anisotropy, Attenuation compensation