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## 六种不同变质程度煤的纵横波速度特征及其与密度的关系

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Characteristics of P-wave and S-wave velocities and their relationships with density of six metamorphic kinds of coals

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摘要

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摘要 对采自不同地区和煤矿的六种不同变质程度煤样进行常温常压条件下的超声测量. 测量发现: 煤的纵波与横波速度均与密度存在良好的线性正相关关系, 且沿煤层走向、倾向和垂直煤层层理方向的纵横波速度逐渐降低; 走向、倾向和垂向上的纵波速度与同一方向的横波速度也存在良好的线性正相关性; 六种煤样三个方向间的速度各向异性一般都大于10%. 通过与经典经验公式—Gardner与Castagna公式理论换算值的对比发现: 由于煤层的软岩特征, 理论换算煤的纵波速度、横波速度与实验室实测值之间存在较大误差. 因此, 在煤田地震勘探中应使用根据煤的岩石物理测试而形成的关系式.

关键词 纵波, 横波, 速度, 密度, 各向异性

Abstract: A lab ultrasonic measurement of six metamorphic kinds of coals was conducted under 25°C and 0.1 MPa condition. And then some phenomena were concluded as follows: There are better linear correlations between pressure wave (P-wave) velocity and density, shear wave (S-wave) velocity and density; and the correlation coefficients of strike, dip and vertical directions are different and decreasing. Also there are positive linear correlation between P- and S-wave velocity in the same direction. However, there are great difference between velocities of different directions, especially in the strike and the vertical direction. The average anisotropy is about 0.1 and even more. Through comparing and analyzing the measured values with the estimated values, according to Gardner and Castagna formula, a non-tolerated error was found, which means that these two experience formulas cannot be applied to coal, and a suitable coal formula should be used in coal seam seismic exploration.

Keywords Pressure wave, Shear wave, Velocity, Density, Anisotropy

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