时窗能量特征法拾取微地震波初始到时的可行性研究

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摘要　微地震（MS）波初始到时的自动拾取是MS监测数据处理的关键技术之一，也是实现MS震源自动定位的技术难点.本文在MS震源定位结果反演与推断的研究基础上，对不同类型MS波的到时点特征进行了分析与描述，并对不同时窗长度下能量特征值的变化规律进行了研究，提出了控制时窗移动范围和确定时窗长度自适应参数的具体方法，利用建立的MS波初始到时点特征的模式识别库，对拾取的到时进行模式归类、定量评价和匹配，提高了自动拾取结果的可靠性.研究结果表明，对典型的信噪比高的MS波，到时自动拾取的结果与手工拾取的结果基本一致；对无量纲大振幅的MS波，到时自动拾取结果的可靠性要高于手工拾取，对信噪比低和到时点不清晰的MS波自动拾取的可靠性较低.

关键词　微地震　时窗　能量特征　模式识别　初始到时　拾取
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Possibility of automatically picking first arrival of microseismic wave by energy eigenvalue method

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Abstract

Picking the first arrival of microseismic (MS) wave is a frequently discussed issue in data processing, and also the most important basis of automatic source location. Through analysis and description of different patterns of first arrival point, and also through comparison of variation value against different window lengths, a method of automatically controlling the range and width of time-window was put forward，together with corresponding parameters. With the development of pattern recognition theory, a simple but effective systematic method was developed to improve the stability of picking arrival time, by using classifying, quantitative analyzing and matching. The test results show that the automatically picked first arrivals approximate to the manually picked ones as long as SNR is high, but when SNR of MS wave is low or the first arrival point of MS wave is ambiguous, the automatically picked results are inaccurate. It also shows that if the amplitude ratio between crest amplitude and arrival point amplitude is high, the results from automatic picking are more reliable than those manually picked.

Key words　Microseismic monitoring; Time-window; Energy eigenvalue; Pattern recognition; First arrival;Time-picking

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