

基于EMD的土壤有机质含量近红外光谱检测 Near-infrared Spectrum Detection of Soil Organic Matter Content Based on Empirical Mode Decomposition

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摘要: 以检测土壤有机质含量为例, 探讨经验模态分解在土壤近红外光谱检测中的应用, 提出了应用的原理和步骤。用处理后的光谱计算了土壤中的有机质含量, 并与九点平滑和小波变换方法的处理结果进行了对比分析。结果表明: 与传统的九点平滑处理结果相比, SNR 从3 dB左右提高到10 dB左右, 原始信号与消噪信号之间的标准差由2.972降到0.901; 预测集的决定系数 r^2 由0.9410提高到0.9803, 预测均方根误差 RMSEP 由0.6702降为0.3011。证明了经验模态分解方法在光谱处理过程中的可靠性, 提高了土壤有机质含量近红外光谱的定量分析精度。 Taking detection of soil organic matter content as an example, this paper discussed the application method of empirical mode decomposition (EMD) for processing soil near-infrared (NIR) differential spectrum using empirical mode decomposition. And the principles and steps of processing were proposed. Then the soil organic matter content was calculated based on the de-noised spectrum, and it was compared with the result from the nine-point smoothing method and wavelet method. Experimental results showed that the SNR was improved from 3 dB to 10 dB, and the root mean square error of between raw signal and de-noised signal were reduced to 0.901 from 2.972. The correlation ratio of the prediction set was improved to 0.9803 from 0.9410, and the RMSEP was reduced to 0.3011 from 0.6702. This improved that EMD is effective to get the pretreatment of NIR spectrum, and the EMD method improves the accuracy of near-infrared spectrum detection of soil organic matter content.

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