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南海东北部内波特征——经验模态分解方法应用初探

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摘要 利用地震海洋学方法研究海洋内波已成为海洋地球物理学家与物理海洋学家共同关注的前沿问题.本文尝试利用当今时频分析的新手段——希尔伯特-黄变换中的经验模态分解（EMD）方法对南海东北部地震数据处理获得的垂直位移分布数据进行分解，获得了一些有新意的结果.分解结果表明，南海东北部海盆上方区域的内波包含波长约1.2、2.5、4、12.5 km的组成成分，其中波长约1.2、2.5 km的内波在200～1050 m的深度范围内上、下各层的波动基本耦合；波长约4 km与12.5 km的内波以600～700 m的水层为分界，其上、下部分的内波相位差90°，指示低波数内波能量的斜向传播.这些研究表明，EMD方法在内波运动学特征的地震海洋学研究方面有良好的应用前景.

关键词 地震海洋学 海洋内波 南海 经验模态分解

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A preliminary study of application of Empirical Mode Decomposition method in understanding the features of internal waves in the northeastern South China Sea

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Abstract Research on ocean internal waves by seismic oceanography is a frontier issue concerned by marine geophysicists and physical oceanographers. The paper applied Empirical Mode Decomposition (EMD) method of a new time-frequency analysis tool- Hilbert-Huang transform for studying vertical displacement data of internal waves in the northeastern South China Sea from seismic data and obtained new results. It showed that the internal waves above the central basin of South China Sea consist of components of different wavelength of around 1.2, 2.5, 4, 12.5 km. The internal waves of the wavelength of 1.2 and 2.5 km are coupled between the upper and the lower part within the depth range of 200～1050 m, while the separated interface located at 600～700 m exists for the internal waves of the wavelength of around 4 and 12.5 km and the phase change is about 90° between the upper and the lower part, which infers oblique propagation of low wave-number internal waves energy. It inferred there is nice potential application of EMD method in seismic oceanography research.

Key words Seismic oceanography;Ocean internal waves;The South China Sea;Empirical Mode Decomposition (EMD)

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