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[54] **FREQUENCY ANALYZING METHOD AND APPARATUS AND PLURAL PITCH FREQUENCIES DETECTING METHOD AND APPARATUS USING THE SAME**

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[52] **U.S. Cl.** **702/76**; 702/75

[58] **Field of Search** 364/485; 702/75, 702/76; 704/214, 208, 207

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[57] **ABSTRACT**

A frequency analyzing method according to the invention is a method of analyzing frequency components of an original signal. The method has: a spectrum detecting step of detecting, from the original signal, energy levels of components of a predetermined number of orthogonal function waves which have waveforms each having same start position and end position in a predetermined time window and in which the number of occurrences of periods in the predetermined time window or frequencies are different from each other; and an orthogonal function wave changing step of changing at least one of the start position and the end position within the predetermined time window after completion of the spectrum detecting step, wherein the spectrum detecting step and the orthogonal function wave changing step are alternately repeated. According to the invention, it is possible to provide frequency analyzing method and apparatus which can contribute to estimate each correct fundamental frequency from a complex distorted wave signal such as a musical signal or the like by a relatively simple construction and to provide complex sound separating method and apparatus using the frequency analyzing method or apparatus.

16 Claims, 12 Drawing Sheets