

level which is obtained by said spectrum detecting step is set to a fundamental wave, executing an operation to obtain the sum of the energy level of the component of said orthogonal function wave corresponding to the fundamental wave and the energy levels of components of a predetermined number of orthogonal function waves corresponding to harmonics of said fundamental wave and having waveforms each having the same start position and end position as those of said fundamental wave in a predetermined time window each time said orthogonal function wave which is assumed as a fundamental wave is switched, and of discriminating one of the sums obtained by said operations which is regarded such that a ratio to a total level of the energy levels of the components of all of said orthogonal function waves having waveforms each having the same start position and end position as those of said orthogonal function wave corresponding to the assumed fundamental wave is largest;

a repeating step of changing at least one of said start position and said end position within said predetermined time window and allowing said spectrum detecting step and said operation discriminating step to be executed;

an estimating step of selecting the largest sum among all of the sums discriminated by said operation discriminating step as a result of said repeating step and estimating a pitch frequency from a period or a frequency of said orthogonal function wave corresponding to said fundamental wave presumed in said operation by which the selected sum was obtained; and

an eliminating step of eliminating from said original signal the component of said orthogonal function wave corresponding to said pitch frequency estimated by said estimating step and the components of said orthogonal function waves corresponding to harmonics of said fundamental wave corresponding to the estimated pitch frequency,

wherein a residual component of said original signal which is obtained as a result of said eliminating step is set to a new original signal and each of said steps is repeated.

12. A frequency analyzing apparatus for analyzing a frequency component of an original signal, comprising:

spectrum detecting means for detecting, from said 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 said predetermined time window or frequencies are different from each other; and

orthogonal function wave changing means for changing at least one of said start position and said end position in said predetermined time window to change a width of an analysis frame each time the energy levels of the components of said predetermined number of orthogonal function waves are detected.

13. A frequency analyzing apparatus for analyzing a frequency on the basis of energy levels of components of a plurality of orthogonal function waves detected from an original signal, comprising:

operation discriminating means for assuming that one of said orthogonal function waves is set to a fundamental wave, executing an operation to obtain the sum of the energy level of the component of said orthogonal

function wave corresponding to the fundamental wave and the energy levels of components of a predetermined number of orthogonal function waves corresponding to harmonics of said fundamental wave and having waveforms each having the same start position and end position as those of said fundamental wave in a predetermined time window each time said orthogonal function wave which is assumed as a fundamental wave is switched and of discriminating one of the sums obtained by said operations which is regarded such that a ratio to a total level of the energy levels of the components of all of said orthogonal function waves having waveforms each having the same start position and end position as those of said orthogonal function wave corresponding to the assumed fundamental wave is largest;

changing means for changing at least one of said start position and said end position within said predetermined time window every predetermined number of orthogonal function waves having waveforms each having the same start position and the same end position; and

estimating means for selecting the largest sum among all of the sums discriminated by said operation discriminating means every predetermined number of orthogonal function waves having the waveforms each having the same start position and the same end position and estimating a pitch frequency from a period or a frequency of said orthogonal function wave corresponding to said fundamental wave presumed in said operation by which the selected sum was obtained.

14. A plural pitch frequencies detecting apparatus for detecting each pitch frequency of an original signal, comprising:

spectrum detecting means for detecting, from said 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 said predetermined time window or frequencies are different from each other;

operation discriminating means for assuming that one of said orthogonal function waves regarding the energy level which is obtained by said spectrum detecting means is set to a fundamental wave, executing an operation to obtain the sum of the energy level of the component of said orthogonal function wave corresponding to the fundamental wave and the energy levels of components of a predetermined number of orthogonal function waves corresponding to harmonics of said fundamental wave and having waveforms each having the same start position and end position as those of said fundamental wave in a predetermined time window each time said orthogonal function wave which is assumed as a fundamental wave is switched and of discriminating one of the sums obtained by said operations which is regarded such that a ratio to a total level of the energy levels of the components of all of said orthogonal function waves having waveforms each having the same start position and end position as those of said orthogonal function wave corresponding to the assumed fundamental wave is largest;

changing means for changing at least one of said start position and said end position within said predetermined time window every predetermined number of