

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 the fundamental wave is switched, and of discriminating one of the sums obtained by the operations which is regarded such that a ratio to a total level of said 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 operation discriminating step to be executed; and
- 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 said selected sum was obtained.

5. A method according to claim 4, wherein said predetermined number is equal to 5.

6. A method according to claim 4, wherein said operation discriminating step has:

- a normalizing step of normalizing, with respect to said total level, the energy levels of the components of all of the orthogonal function waves having waveforms each having the same start position and end position with those of the orthogonal function wave corresponding to the presumed fundamental wave;
- a step of executing said operation on the basis of the energy levels obtained by said normalizing step; and
- a step of discriminating the largest one of the sums obtained by said operation.

7. A method according to claim 5, wherein said operation discriminating step has:

- a normalizing step of normalizing, with respect to said total level, the energy levels of the components of all of the orthogonal function waves having waveforms each having the same start position and end position with those of the orthogonal function wave corresponding to the presumed fundamental wave;
- a step of executing said operation on the basis of the energy levels obtained by said normalizing step; and
- a step of discriminating the largest one of the sums obtained by said operation.

8. A plural pitch frequencies detecting method of detecting each pitch frequency of an original signal by using a frequency analyzing method,

wherein said frequency analyzing method is a method of analyzing a frequency on the basis of energy levels of components of a plurality of orthogonal function waves detected from said original signal and comprises:

- an operation discriminating step of 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 the operations which is regarded such that a ratio to a total level of said 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 operation discriminating step to be executed; and

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 said selected sum was obtained,

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

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

9. A plural pitch frequencies detecting method according to claim 8,

wherein said predetermined number is equal to 5.

10. A plural pitch frequency detecting method according to claim 8, wherein said operation discriminating step has:

- a normalizing step of normalizing, with respect to said total level, the energy levels of the components of all of the orthogonal function waves having waveforms each having the same start position and end position with those of the orthogonal function wave corresponding to the presumed fundamental wave;
- a step of executing said operation on the basis of the energy levels obtained by said normalizing step; and
- a step of discriminating the largest one of the sums obtained by said operation.

11. A plural pitch frequencies detecting method of detecting each pitch frequency of an original signal, comprising: a spectrum detecting step of 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;

- an operation discriminating step of assuming that one of said orthogonal function waves regarding the energy