CLAIMS

1. An audio signal processing method, comprising:

determining, according to an energy attribute value and a spectral attribute value of M sub-bands of N sub-bands of an audio signal, whether to modify quantized energy envelopes of the M sub-bands, wherein the N sub-bands further comprise K sub-bands, the M sub-bands and the K sub-bands have no overlap in frequency, wherein the largest frequency of the M sub-bands is lower than the lowest frequency of the K sub-bands, both M and K are positive integers, and N=M+K;

based on a determination that the quantized energy envelopes of the M sub-bands need to be modified, modifying the quantized energy envelopes of the M sub-bands individually to obtain modified energy envelopes of the M sub-bands; and

performing bit allocation on the N sub-bands according to the modified energy envelopes of the M sub-bands and energy envelope information of the K sub-bands.

2. The method according to claim 1, wherein the energy attribute value of M-subbands is determined according to quantized energy envelopes of the N sub-bands.

3. The method according to claim 2, wherein the energy attribute value of the M sub-bands is determining by:

obtaining a sum of the quantized energy envelopes of the M sub-bands;

obtaining a sum of the quantized energy envelopes of the K sub-bands; and

calculating a ratio of the sum of the quantized energy envelopes of the M sub-bands to the sum of the quantized energy envelopes of the K sub-bands, wherein the ratio represents the energy attribute value of the M sub-bands.

4. The method according to any one of claims 1-3, wherein the spectral attribute value of the M sub-bands is determined according to the quantized energy envelopes of the M sub-bands.

5. The method according to claim 4, wherein the spectral attribute value of the M sub-bands is determined by:

obtaining a sum of the quantized energy envelopes of the M sub-bands; and

calculating a ratio of a quantized energy envelope of a first sub-band within the M sub-bands to the sum of the quantized energy envelopes of the M sub-bands, wherein the ratio represents the spectral attribute value of the M sub-bands, and wherein the quantized energy envelope of the first sub-band is the largest among the M sub-bands.

6. The method according to any one of claims 1-5, wherein when the energy attribute value of the M sub-bands falls within a first range, and the spectral attribute value of the M sub-bands falls within a second range, determining to adjust the quantized energy envelopes of the M sub-bands.

7. The method according to claim 6, wherein the first range is [1/6, 2/3].

8. The method according to claim 6 or 7, wherein when an encoded bandwidth of the audio signal is 0 to 4 KHz, the second range is $[\frac{1}{0.575*M}, \infty)$.

9. The method according to claim 6 or 7, wherein when an encoded bandwidth of the audio signal is 0 to 8 KHz, the second range is $[\frac{1}{0.5*M}, \infty)$.

10. The method according to any one of claims 1-9, wherein the modifying the quantized energy envelopes of the M sub-bands individually to obtain modified energy envelopes of the M sub-bands comprises:

determining, according to a sum of the quantized energy envelopes of the M sub-bands and a quantized energy envelope of a first sub-band within the M sub-bands, a modifying factor for each of the M sub-bands, wherein the quantized energy envelope of the first sub-band is the largest among the M sub-bands; and

modifying the quantized energy envelopes of the M sub-bands individually using the modifying factors, to obtain the modified energy envelopes of the M sub-bands.

11. The method according to any one of claims 1-10, wherein a modified energy

envelope of each sub-band of the M sub-bands is greater than a quantized energy envelope of the same sub-band.

12. The method according to any one of claims 1-11, wherein the energy envelope information of the K sub-bands comprises energy envelopes of the K sub-bands, wherein an energy envelope of a sub-band of the K sub-bands is either a quantized energy envelope or an energy envelope that is obtained by modifying the quantized energy envelope.

13. An audio signal processing device, comprising:

a determining unit, configured to determine, according to an energy attribute value and a spectral attribute value of M sub-bands of N sub-bands of an audio signal, whether to modify quantized energy envelopes of the M sub-bands, wherein the N sub-bands further comprise K sub-bands, the M sub-bands and the K sub-bands have no overlap in frequency, wherein the largest frequency of the M sub-bands is lower than the lowest frequency of the K sub-bands, both M and K are positive integers, and N=M+K;

a modification unit, configured to based on a determination that the quantized energy envelopes of the M sub-bands need to be modified, modify the quantized energy envelopes of the M sub-bands individually to obtain modified energy envelopes of the M sub-bands; and

an allocation unit, configured to performing bit allocation on the N sub-bands according to the modified energy envelopes of the M sub-bands and energy envelope information of the K sub-bands.

14. The device according to claim 13, wherein the energy attribute value of M-subbands is determined according to quantized energy envelopes of the N sub-bands.

15. The device according to claim 14, wherein in determine the energy attribute value of the M sub-bands, the determining unit is configured to:

obtain a sum of the quantized energy envelopes of the M sub-bands;

obtain a sum of the quantized energy envelopes of the K sub-bands; and

calculate a ratio of the sum of the quantized energy envelopes of the M sub-bands to the sum of the quantized energy envelopes of the K sub-bands, wherein the ratio represents

the energy attribute value of the M sub-bands.

16. The device according to any one of claims 13-15, wherein the spectral attribute value of the M sub-bands is determined according to the quantized energy envelopes of the M sub-bands.

17. The device according to claim 16, wherein in determine the spectral attribute value of the M sub-bands, the determining unit is configured to:

obtain a sum of the quantized energy envelopes of the M sub-bands; and

calculate a ratio of a quantized energy envelope of a first sub-band within the M sub-bands to the sum of the quantized energy envelopes of the M sub-bands, wherein the ratio represents the spectral attribute value of the M sub-bands, and wherein the quantized energy envelope of the first sub-band is the largest among the M sub-bands.

18. The device according to any one of claims 13-17, wherein when the energy attribute value of the M sub-bands falls within a first range, and the spectral attribute value of the M sub-bands falls within a second range, the determining unit is configured to determine to adjust the quantized energy envelopes of the M sub-bands.

19. The device according to claim 18, wherein the first range is [1/6, 2/3].

20. The device according to claim 18 or 19, wherein when an encoded bandwidth of the audio signal is 0 to 4 KHz, the second range is $[\frac{1}{0.575*M}, \infty)$.

21. The device according to claim 18 or 19, wherein when an encoded bandwidth of the audio signal is 0 to 8 KHz, the second range is $[\frac{1}{0.5*M}, \infty)$.

22. The device according to any one of claims 13-21, wherein the modification unit is configured to:

determine, according to a sum of the quantized energy envelopes of the M sub-bands

and a quantized energy envelope of a first sub-band within the M sub-bands, a modifying factor for each of the M sub-bands, wherein the quantized energy envelope of the first sub-band is the largest among the M sub-bands; and

modify the quantized energy envelopes of the M sub-bands individually using the modifying factors, to obtain the modified energy envelopes of the M sub-bands.

23. The device according to any one of claims 13-22, wherein a modified energy envelope of each sub-band of the M sub-bands is greater than a quantized energy envelope of the same sub-band.

24. The device according to any one of claims 13-23, wherein the energy envelope information of the K sub-bands comprises energy envelopes of the K sub-bands, wherein an energy envelope of a sub-band of the K sub-bands is either a quantized energy envelope or an energy envelope that is obtained by modifying the quantized energy envelope.

25. A computer-readable storage medium having a program recorded thereon; where the program makes the computer execute method of any of claims 1 to 12.

26. A computer program configured to cause a computer to execute method of any of claims 1 to 12.