Claims

1. Apparatus for decoding an encoded audio signal, comprising:

a spectral domain audio decoder ~~(112)~~ configured for generating a first decoded representation of a first set of first spectral portions, the decoded representation having a first spectral resolution;

a parametric decoder ~~(114)~~ configured for generating a second decoded representation of a second set of second spectral portions, the second decoded representation comprising spectral envelope information having a second spectral resolution being lower than the first spectral resolution;

a frequency regenerator ~~(116)~~ configured for regenerating a reconstructed second spectral portion having the first spectral resolution using a first spectral portion and the spectral envelope information for a second spectral portion from the second set of second spectral portions; and

a spectrum time converter ~~(118)~~configured for converting the first decoded representation and the reconstructed second spectral portion into a time representation,

wherein the spectral domain audio decoder is configured to generate the first decoded representation so that the first decoded representation has a Nyquist frequency defining a sampling rate being equal to a sampling rate of the time representation generated by the spectrum-time converter, or

wherein the spectral domain audio decoder is configured to generate the first decoded representation so that a first spectral portion is placed, with respect to frequency, between two second spectral portions.

2. Apparatus of claim 1, wherein the parametric decoder is configured for generating the second decoded representation comprising matching information on a first spectral portion indicating that the first spectral portion matches with a second spectral portion, and

wherein the frequency regenerator is configured for regenerating the reconstructed second spectral portion using the first spectral portion identified by the matching information.

3. Apparatus of claim 1 or 2, wherein the spectral domain audio decoder (112) is configured to output a sequence of decoded frames of spectral values, a decoded frame being the first decoded representation, wherein the frame comprises spectral values for the first set of spectral portions and zero indications for the second set of second spectral portions,

wherein the apparatus for decoding further comprises a combiner (208) for combining spectral values generated by the frequency regenerator for the second set of second spectral portions and spectral values of the first set of first spectral portions in a reconstruction band to obtain a reconstructed spectral frame comprising spectral values for the first set of the first spectral portions and the second set of second spectral portion, and

wherein the spectrum-time converter (118) is configured to convert the reconstructed spectral frame into the time representation.

4. Apparatus of one of the preceding claims, wherein the spectrum-time converter (118) is configured to perform an inverse modified discrete cosine transform (512, 514), and further comprises an overlap-add stage (516) for overlapping and adding subsequent time domain frames, each subsequent time domain frame originating from a spectrum representation comprising the first decoded representation and the reconstructed second spectral portion.

5. Apparatus of one of the preceding claims, wherein a maximum frequency represented by a spectral value for the maximum frequency in the first decoded representation is equal to a maximum frequency included in the time representation generated by the spectrum-time converter (118), wherein the spectral value for the maximum frequency in the first representation is zero or different from zero.

6. Apparatus of one of the preceding claims,

wherein the encoded audio signal comprises the first encoded representation being a frequency domain encoded version of the first set of first spectral portions and an encoded version of the second set of second spectral portions,

wherein the apparatus further comprises a data stream parser (200) for extracting the first encoded representation and for forwarding the encoded representation to the spectral domain audio decoder (112) and for extracting the second encoded representation and for forwarding the second encoded representation to the parametric decoder (114).

7. The apparatus in accordance with one of the preceding claims, wherein the encoded audio signal further comprises an encoded representation of the third set of third spectral portions (301) to be reconstructed by noise filling, further comprising:

a noise filler for extracting noise filling information (308) from the encoded representation of the third set of third spectral portions and for applying a noise filling operation in the third set of third spectral portions without using a first spectral portion in a different frequency range to generate a reconstructed third spectral portion,

wherein the spectrum-time converter (118) is configured for additionally converting the third spectral portion into the time representation.

8. Apparatus in accordance with one of the preceding claims,

wherein the spectral domain audio decoder (112) is configured to generate the first decoded representation having the first spectral portions with frequency values being greater than a frequency being equal to a frequency in a middle of a frequency range covered by the time representation output by the spectrum-time converter (118).

9. Apparatus of one of the preceding claims,

wherein the frequency regenerator (116) is configured to generate a reconstruction band having a spectral portion of the first set of spectral portions at a frequency in the reconstruction band being different from a center frequency of the reconstruction band, wherein the reconstruction band is a scale factor band, for

which an energy value indicating the spectral envelope information is included in the second set of second spectral portions having the second spectral resolution.

10. Apparatus for encoding an audio signal, comprising:

a time-spectrum converter (100)configured for converting an audio signal (99) having a sampling rate into a spectral representation;

a spectral analyzer (102)configured for analyzing the spectral representation for determining a first set of first spectral portions to be encoded with a first spectral resolution and a different second set of second spectral portions to be encoded with a second spectral resolution, the second spectral resolution being smaller than the first spectral resolution, wherein a first spectral portion (306) is placed, with respect to frequency, between two second spectral portions (307a, 307b);

a spectral domain audio encoder (106) configured for generating a first encoded representation of the first set of spectral portions having the first spectral resolution; and

a parametric coder (104) configured for calculating spectral envelope information for the second set of second spectral portions, the spectral envelope information having the second spectral resolution.

11. Apparatus of claim 10, wherein the parameter coder (104) is configured for calculating similarities between source ranges having first spectral portions and target ranges having second spectral portions and for determining, based on calculated similarities, for a second spectral portion, a first spectral portion matching with the second spectral portion and for providing the matching information on the first spectral portion matching with the second spectral portion into an encoded representation.

12. Apparatus of one of claims 10 or 11,

wherein the spectral analyzer (102) is configured for analyzing the spectral representation up to a maximum analysis frequency being at least one quarter of a sampling frequency of the audio signal (99).

13. Apparatus of one of claims 10 to 13,

wherein the time-spectrum converter is configured for windowing ~~(502)~~ the audio signal with overlapping windows to obtain a sequence of windowed frames, a windowed frame having a first number of samples, and for converting ~~(506)~~ the sequence of frames into a spectral representation to obtain spectral frames, a spectral frame having a second number of spectral samples, the second number being smaller than the first number.

14. Apparatus of one of claims 10 to 13,

wherein the spectral domain audio encoder ~~(106)~~ is configured to process a sequence of frames of spectral values for quantization and entropy coding, wherein, in a frame, spectral values of the second set of second portions are set to zero or wherein, in a frame, spectral values of the first set of first spectral portions and the second set of the second spectral portions are present and wherein, during processing or subsequent to processing, spectral values in the second set of spectral values are set to zero ~~(410, 418, 422)~~.

15. Apparatus of one of claims 10 to 14,

wherein the spectral domain audio encoder ~~(106)~~ is configured to generate a spectral representation having a Nyquist frequency defined by the sampling rate of the audio signal ~~(99)~~.

16. Apparatus of one of claims 10 to 15,

wherein the spectral domain audio encoder ~~(106)~~ is configured to provide the first encoded representation so that, for a frame of a sampled audio signal, the encoded representation comprises the first set of first spectral portions and the second set of second spectral portions, wherein the spectral values in the second set of spectral portions are encoded as zero or noise values.

17. Apparatus of one of claims 10 to 16,

wherein the spectral analyzer ~~(102)~~ is configured to analyze the spectral representation starting with a frequency gap filling start frequency ~~(309)~~, and ending with a maximum frequency ~~(f_{max})~~ represented by a maximum frequency included in the spectral representation, and

wherein a spectral portion extending from a minimum frequency up to the frequency gap filling start frequency ~~(309)~~ belongs to the first set of first spectral portions.

18. Apparatus of one of claims 10 to 17,

wherein the spectral analyzer ~~(102)~~ is configured to apply a tonal mask processing to at least a portion of the spectral representation so that tonal components and non-tonal components are separated from each other, wherein the first set of the first spectral portions comprises tonal components and wherein the second set of the second spectral portions comprises the non-tonal components.

19. Apparatus of one of claims 10 to 18,

wherein the spectral domain audio encoder ~~(106)~~ comprises a psycho-acoustic module ~~(402)~~ for quantizing the first set of first spectral portions under consideration of a masking threshold determined in the psycho-acoustic module ~~(402)~~.

20. Apparatus of one of the claims 10 to 19,

wherein the time-spectrum converter ~~(100)~~ is configured to apply a Modified Discrete Cosine Transform ~~(MDCT)~~.

21. Apparatus of one of claims 10 to 19,

wherein the spectral analyzer ~~(102)~~ is configured to separate tonal components from non-tonal components in the spectral representation ~~(101)~~,

wherein the spectral analyzer is configured to further analyze the non-tonal components to be reconstructed by using a spectral portion from the first set of spectral portions, wherein the spectral analyzer ~~(102)~~ is configured to determine noise-like spectral portions in the non-tonal components to be reconstructed by noise filling,

wherein the first set of first spectral portions comprises the tonal components, wherein the second set of second spectral portions comprises the spectral portions

in the non-tonal components, and wherein a third set of third spectral portions comprises the noise-like spectral portions to be reconstructed by noise filling,

wherein the parametric coder ~~(104)~~ is configured for introducing an energy information for the noise-like spectral portions into the second encoded representation.

22. Apparatus of one of claims 10 to 21,

wherein the spectral analyzer ~~(102)~~ is configured to analyze the spectral representation in a frequency range starting from a frequency gap filling start frequency and extending to frequencies higher than the frequency gap filling frequency ~~(309)~~.

wherein the spectral domain audio encoder ~~(106)~~ is configured to encode at least a third spectral portion in the spectral representation having frequencies below the frequency gap filling start frequency ~~(309)~~ with a spectral resolution lower than the first spectral resolution by setting spectral values in the third spectral portion to zero and by calculating and encoding the spectral envelope information ~~(308)~~ indicating an energy in the at least third spectral portion.

23. Method of decoding an encoded audio signal, comprising:

generating ~~(112)~~ a first decoded representation of a first set of first spectral portions, the decoded representation having a first spectral resolution;

generating ~~(114)~~ a second decoded representation of a second set of second spectral portions, the second decoded representation comprising spectral envelope information having a second spectral resolution being lower than the first spectral resolution;

regenerating ~~(116)~~ a reconstructed second spectral portion having the first spectral resolution using a first spectral portion and the spectral envelope information for a second spectral portion from the second set of second spectral portions; and

converting ~~(118)~~ the first decoded representation and the reconstructed second spectral portion into a time representation,

wherein the generating the first decoded representation generates the first decoded representation so that the first decoded representation has a Nyquist frequency defining a sampling rate being equal to a sampling rate of the time representation generated by the converting, or

wherein the generating the first decoded representation generates the first decoded representation so that a first spectral portion is placed, with respect to frequency, between two second spectral portions.

24. Method for encoding an audio signal, comprising:

converting ~~(100)~~ an audio signal ~~(99)~~ having a sampling rate into a spectral representation;

analyzing ~~(102)~~ the spectral representation for determining a first set of first spectral portions to be encoded with a first spectral resolution and a different second set of second spectral portions to be encoded with a second spectral resolution, the second spectral resolution being smaller than the first spectral resolution, wherein a first spectral portion ~~(306)~~ is placed, with respect to frequency, between two second spectral portions ~~(307a, 307b)~~;

generating ~~(106)~~ a first encoded representation of the first set of spectral portions having the first spectral resolution; and

calculating ~~(104)~~ spectral envelope information for the second set of second spectral portions, the spectral envelope information having the second spectral resolution.

25. Computer program for performing, when running on a computer or processor, one of the methods of claim 23 or 24.