Claims

1. An audio processor ~~(50')~~ for processing an audio signal ~~(55)~~, the audio processor ~~(50')~~ comprising:

a target phase measure determiner ~~(65')~~ for determining a target phase measure ~~(85')~~ for the audio signal ~~(55)~~ in a time frame ~~(75)~~;

a phase error calculator ~~(200)~~ for calculating a phase error ~~(105')~~ using a phase of the audio signal ~~(55)~~ in the time frame ~~(75)~~ and the target phase measure ~~(85')~~; and

a phase corrector ~~(70')~~ configured for correcting the phase of the audio signal ~~(55)~~ in the time frame using the phase error ~~(105')~~.

2. The audio processor ~~(50')~~ according to claim 1,

wherein the audio signal ~~(55)~~ comprises a plurality of subbands ~~(95)~~ for the time frame ~~(75)~~;

wherein the target phase measure determiner ~~(65')~~ is configured for determining a first target phase measure ~~(85a')~~ for a first subband signal ~~(95a)~~ and a second target phase measure ~~(85b')~~ for a second subband signal ~~(95b)~~;

wherein the phase error calculator ~~(200)~~ is configured for forming a vector of phase errors ~~(105')~~, wherein a first element of the vector refers to a first deviation ~~(105a')~~ of the phase of the first subband signal ~~(95a)~~ and the first target phase measure ~~(85a')~~ and wherein a second element of the vector refers to a second deviation ~~(105b')~~ of the phase of the second subband signal ~~(95b)~~ and the second target phase measure ~~(85b')~~;

comprising an audio signal synthesizer ~~(100)~~ for synthesizing a corrected audio signal ~~(90')~~ using a corrected first subband signal ~~(90a')~~ and a corrected second subband signal ~~(90b')~~.

3. The audio processor ~~(50')~~ according to claim 1 or 2,

wherein a plurality of subbands ~~(95)~~ is grouped into a baseband ~~(30)~~ and a set of frequency patches ~~(40)~~, the baseband ~~(30)~~ comprising one subband ~~(95)~~ of the audio signal ~~(55)~~ and the set of frequency patches ~~(40)~~, comprising the at least one subband ~~(95)~~ of the baseband ~~(30)~~ at a frequency higher than the frequency of the at least one subband in the baseband;

wherein the phase error calculator ~~(200)~~ is configured for calculating a mean of elements of a vector of phase errors ~~(105')~~ referring to a first patch ~~(40a)~~ of the set of frequency patches ~~(40)~~ to obtain an average phase error ~~(105'')~~;

wherein the phase corrector ~~(70')~~ is configured for correcting a phase of the subband signals ~~(95)~~ in the first and subsequent frequency patches ~~(40)~~ of the set of frequency patches using a weighted average phase error, wherein the average phase error ~~(105'')~~ is weighted according to an index of the frequency patch ~~(40)~~ to obtain a modified patch signal ~~(40')~~.

4. The audio processor ~~(50')~~ according to one of claims 1 to 3 comprising:

an audio signal phase derivative calculator ~~(210)~~ configured for calculating a mean of phase derivatives over frequency (PDF) ~~(215)~~ for a baseband ~~(30)~~;

the phase corrector ~~(70')~~ configured for calculating a further modified patch signal ~~(40'')~~ with an optimized first frequency patch by adding the mean of the phase derivatives over frequency ~~(215)~~, weighted by a current subband index, to the phase of the subband signal with a highest subband index in a baseband ~~(30)~~ of the audio signal ~~(55)~~.

5. The audio processor ~~(50')~~ according to one of claims 1 to 3 comprising:

an audio signal phase derivative calculator ~~(210)~~ configured for calculating a mean of phase derivatives over frequency (PDF) ~~(215)~~ for a plurality of subband signals comprising higher frequencies than the baseband signal ~~(30)~~ to detect transients in the subband signal ~~(95)~~;

the phase corrector ~~(70')~~ configured for calculating a further modified patch signal ~~(40'')~~ with an optimized first frequency patch by adding the mean of the phase derivatives over frequency ~~(215)~~, weighted by a current subband index, to the phase of the subband signal with a highest subband index in a baseband ~~(30)~~ of the audio signal ~~(55)~~.

6. The audio processor ~~(50')~~ according to claim 4 or 5,

wherein the phase corrector ~~(70')~~ is configured for recursively updating, based on the frequency patches ~~(40)~~, the further modified patch signal ~~(40'')~~ by adding the mean of the phase derivatives over frequency ~~(215)~~, weighted by the subband index of the current subband ~~(95)~~, to the phase of the subband signal with the highest subband index in the previous frequency patch.

7. The audio processor ~~(50')~~ according to claim 6,

wherein the phase corrector ~~(70')~~ is configured for calculating a weighted mean of the modified patch signal ~~(40')~~ and the further modified patch signal ~~(40'')~~ to obtain a combined modified patch signal ~~(40''')~~;

wherein the phase corrector ~~(70')~~ is configured for recursively updating, based on the frequency patches ~~(40)~~, the combined modified patch signal ~~(40''')~~ by adding the mean of the phase derivatives over frequency ~~(215)~~, weighted by the subband index of the current subband ~~(95)~~, to the phase of the subband signal with the highest subband index in the previous frequency patch of the combined modified patch signal ~~(40''')~~.

8. The audio processor according to one of claims 1 to 7, wherein the phase corrector ~~(70')~~ is configured to calculate a weighted mean of a patch signal ~~(40')~~ and a modified patch ~~(40'')~~ signal using a circular mean of the patch signal ~~(40)')~~ in the current frequency patch weighted with a first specific weighting function and the modified patch signal ~~(40'')~~ in the current frequency patch weighted with a second specific weighting function.

9. The audio processor ~~(50')~~ according to one of claims 1 to 8, wherein the phase corrector ~~(70')~~ is configured for forming a vector of phase deviations, wherein the

phase deviations are calculated using a combined modified patch signal ~~(40''')~~ and the audio signal ~~(55)~~.

10. The audio processor ~~(50')~~ according to one of claims 1 - 9, wherein the target phase measure determiner ~~(65')~~ comprises:

a data stream extractor ~~(130')~~ configured for extracting a peak position ~~(230)~~ and a fundamental frequency of peak positions ~~(235)~~ in a current time frame of the audio signal ~~(55)~~ from a data stream ~~(135)~~; or

an audio signal analyzer ~~(225)~~ configured for analyzing the audio signal ~~(55)~~ in the current time frame to calculate a peak position ~~(230)~~ and a fundamental frequency of peak positions ~~(235)~~ in the current time frame;

a target spectrum generator ~~(240)~~ for estimating further peak positions in the current time frame using the peak position ~~(230)~~ and the fundamental frequency of peak positions ~~(235)~~.

11. The audio processor ~~(50')~~ according to claim 10, wherein the target spectrum generator ~~(240)~~ comprises:

a peak generator ~~(245)~~ for generating a pulse train ~~(265)~~ over time;

a signal former ~~(250)~~ to adjust a frequency of the pulse train ~~(265)~~ according to the fundamental frequency of peak positions ~~(235)~~;

a pulse positioner ~~(255)~~ to adjust the phase of the pulse train ~~(265)~~ according to the peak position ~~(230)~~;

a spectrum analyzer ~~(260)~~ to generate a phase spectrum of the adjusted pulse train, wherein the phase spectrum of the time domain signal is the target phase measure ~~(85')~~.

12. A decoder ~~(110')~~ for decoding an audio signal ~~(25)~~, the decoder ~~(110')~~ comprising:

a core decoder ~~(115)~~ configured for decoding an audio signal ~~(25)~~ in a time frame of the baseband;

a patcher ~~(120)~~ configured for patching a set of subbands ~~(95)~~ of the decoded baseband, wherein the set of subbands forms a patch, to further subbands in the time frame, adjacent to the baseband, to obtain an audio signal ~~(32)~~ comprising frequencies higher than the frequencies in the baseband;

an audio processor ~~(50')~~ according to one of claims 1 - 11, wherein the audio processor ~~(50')~~ is configured for correcting phases of the subbands of the patch according to a target phase measure.

13. The decoder ~~(110')~~ according to claim 12,

wherein the patcher ~~(120)~~ is configured for patching the set of subbands ~~(95)~~ of the audio signal ~~(25)~~, wherein the set of subbands forms a further patch, to further subbands of the time frame, adjacent to the patch; and

wherein the audio processor ~~(50')~~ is configured for correcting the phases within the subbands of the further patch; or

wherein the patcher ~~(120)~~ is configured for patching the corrected patch to further subbands of the time frame, adjacent to the patch.

14. The decoder ~~(110')~~ according to claim 12 or 13,

wherein the decoder ~~(110')~~ comprises a further audio processor ~~(50)~~ according to one of claims ~~0~~ 1 to ~~0~~11, wherein the further audio processor ~~(50)~~ is configured for receiving a further phase derivative over frequency and to correct transients in the audio signal ~~(32)~~ using the received phase derivative over frequency.

15. An encoder ~~(155')~~ for encoding an audio signal ~~(55)~~, the encoder comprising:

a core encoder ~~(160)~~ configured for core encoding the audio signal ~~(55)~~ to obtain a core encoded audio signal ~~(145)~~ having a reduced number of subbands with respect to the audio signal ~~(55)~~;

a fundamental frequency analyzer ~~(175)~~ for analyzing peak positions ~~(230)~~ in the audio signal ~~(55)~~ or a low-pass filtered version of the audio signal for obtaining a fundamental frequency estimate of peak positions ~~(235)~~ in the audio signal;

a parameter extractor ~~(165)~~ configured for extracting parameters ~~(190)~~ of subbands of the audio signal ~~(55)~~ not included in the core encoded audio signal ~~(145)~~;

an output signal former ~~(170)~~ configured for forming an output signal ~~(135)~~ comprising the core encoded audio signal ~~(145)~~, the parameters ~~(190)~~, the fundamental frequency of peak positions ~~(235)~~, and one of the peak positions ~~(230)~~.

16. The encoder ~~(155)~~ according to claim 15,

wherein the output signal former ~~(170)~~ is configured to form the output signal ~~(135)~~ into a sequence of frames, wherein each frame comprising the core encoded audio signal ~~(145)~~, the parameters ~~(190)~~, and wherein only each Nth frame comprising the fundamental frequency estimate of peak positions ~~(235)~~ and the peak position ~~(230)~~, wherein N is greater or equal than 2.

17. A method ~~(3400)~~ for processing an audio signal ~~(55)~~ with an audio processor ~~(50')~~, the method ~~(3400)~~ comprising the following steps:

determining a target phase measure ~~(85')~~ for the audio signal in a time frame with a target phase measure determiner ~~(65')~~;

calculating a phase error ~~(105')~~ with a phase error calculator ~~(200)~~ using the phase of the audio signal in the time frame and the target phase measure ~~(85')~~; and

correcting the phase of the audio signal in the time frame with a phase corrector ~~(70')~~ using the phase error ~~(105')~~.

18. A method ~~(3500)~~ for decoding an audio signal ~~(25)~~ with a decoder ~~(110')~~, the method ~~(3500)~~ comprising the following steps:

decoding an audio signal ~~(25)~~ in a time frame of the baseband with a core decoder ~~(115)~~;

patching a set of subbands of the decoded baseband with a patcher ~~(120)~~, wherein the set of subbands ~~(95)~~ forms a patch, to further subbands in the time frame, adjacent to the baseband, to obtain an audio signal ~~(32)~~ comprising frequencies higher than the frequencies in the baseband;

correcting phases within the subbands of the first patch with an audio processor ~~(50')~~ according to a target phase measure.

19. A method ~~(3600)~~ for encoding an audio signal with an encoder ~~(155)~~, the method ~~(3600)~~ comprising the following steps:

core encoding the audio signal with a core encoder ~~(160)~~ to obtain a core encoded audio signal ~~(145)~~ having a reduced number of subbands with respect to the audio signal ~~(55)~~;

analyzing the audio signal ~~(55)~~ or a low-pass filtered version of the audio signal with a fundamental frequency analyzer ~~(175)~~ for obtaining a fundamental frequency estimate of peak positions ~~(130)~~ in the audio signal ~~(55)~~;

extracting parameters ~~(190)~~ of subbands of the audio signal ~~(55)~~ not included in the core encoded audio signal with a parameter extractor ~~(165)~~;

forming an output signal ~~(135)~~ with an output signal former ~~(170)~~ comprising the core encoded audio signal ~~(145)~~, the parameters ~~(190)~~, the fundamental frequency of peak positions ~~(235)~~, and one of the peak positions ~~(230)~~.

20. A computer program having a program code for performing the method according to one of claims 17 - 19 when the computer program runs on a computer.

21. An audio signal ~~(135)~~ comprising:

a core encoded audio signal ~~(145)~~ having a reduced number of subbands with respect to an audio signal ~~(55)~~;

a parameter ~~(190)~~ representing subbands of the audio signal ~~(55)~~ not included in the core encoded audio signal ~~(145)~~;

a fundamental frequency estimate of peak positions ~~(235)~~, and a peak position estimate of the audio signal ~~(230)~~.