What is claimed is:

CLAIMS

1. A method of converting a set of frequency-domain input audio signals to a set of frequency-domain output audio signals, the method comprising:

computing, using one or more processors, each frequency-domain output audio signal as a sum of filtered frequency-domain input audio signals, wherein each filter used to filter the frequency-domain input audio signals is characterized by a complex gain function over a respective sub-band frequency range of the frequency-domain input audio signals, wherein contributions of the frequency-domain input audio signals to the frequency-domain output audio signal are determined by a composite frequency-domain gain vector,

wherein the composite frequency-domain gain vector is obtained by:

computing, using the one or more processors, a set of component frequency-domain gain vectors, wherein the set of component frequency-domain gain vectors is augmented with at least one decorrelating component frequency domain gain vector having modified frequency responses to create a decorrelation effect; and

summing, using the one or more processors, the component frequency-domain gain vectors to form the composite frequency-domain gain vector.

2. The method of claim 1, wherein the decorrelating component frequency-domain gain vector is formed by scaling the at least one of the component frequency domain gain vectors by a component gain value.

3. The method of any one of the preceding claims 1 or 2, wherein one or more of the component frequency-domain gain vectors includes a phase response that varies over the sub-band frequency range, thereby providing a group-delay that is substantially constant over the sub-band frequency, and where the group-delay is substantially constant if a fluctuation in the group-delay is small enough to be perceptually insignificant for a listener.

4. The method of any one of the preceding claims 1-2, wherein one or more of the component frequency-domain gain vectors includes a phase response that varies over the sub-band frequency range, thereby providing a group-delay that varies over the sub-band frequency range to provide the decorrelation effect.

5. The method of any one of the preceding claims 1-4, wherein the decorrelating component frequency domain gain vector is formed by multiplying the component frequency domain gain vector by a decorrelation function.

6. A system comprising:

one or more processors; and

a non-transitory computer-readable medium storing instructions that, upon execution by the one or more processors, cause the one or more processors to perform operations of any one of the method claims 1-5.

7. A non-transitory, computer-readable medium storing instructions that, upon execution by one or more processors, cause the one or more processors to perform operations of any one of the method claims 1-5.

8. An audio filterbank with decorrelating components, comprising:

a converter configured to convert a set of time-domain input audio signals into a set of frequency-domain input audio signals; and

a linear mixer configured to convert the set of frequency-domain input audio signals into a set of frequency-domain output audio signals, wherein each frequency-domain output audio signal is a sum of filtered frequency-domain input audio signals, wherein each filter used to filter the frequency-domain input audio signals is characterized by a complex gain function over a respective sub-band frequency range of the frequency-domain input audio signal, and contributions of the frequency-domain input audio signals to the frequency-domain output audio signals are determined by a composite frequency-domain gain vector;

wherein the composite frequency-domain gain vector is obtained by:

computing, using the one or more processors, a set of component frequency-domain gain vectors, wherein the set of component frequency-domain gain vectors is augmented with at least one decorrelating component frequency domain gain vector having modified frequency responses to create a decorrelation effect; and

summing, using the one or more processors, the component frequency-domain gain vectors to form the composite frequency-domain gain vector.

9. The audio filterbank of claim 8, wherein the decorrelating component frequency-domain gain vector is formed by scaling the at least one of the component frequency domain gain vectors by a component gain value.

10. The audio filterbank of any one of the preceding claims 8-9, wherein one or more of the component frequency-domain gain vectors includes a phase response that varies over the sub-band frequency range, thereby providing a group-delay that is approximately constant over the sub-band frequency, and where the group-delay is approximately constant if a fluctuation in the group-delay is small enough to be perceptually insignificant for a listener.

11. The audio filterbank of any one of the preceding claims 8-9, wherein one or more of the component frequency-domain gain vectors includes a phase response that varies over the sub-band frequency range, thereby providing a group-delay that varies over the sub-band frequency range to provide the decorrelation effect on the frequency-domain output audio signal.

12. The audio filterbank of any one of the preceding claims 8-11, wherein the decorrelating component frequency domain gain vector is formed by multiplying the component frequency domain gain vector by a decorrelation function.