Claims

1. Apparatus for synthesizing a spatially extended sound source, comprising:

an input interface for receiving a description of an audio scene, the description of the audio scene comprising spatially extended sound source data on the spatially extended sound source and modification data on a potentially modifying object, and for receiving a listener data;

a sector identification processor for identifying a limited modified spatial sector for the spatially extended sound source within a rendering range for the listener, the rendering range for the listener being larger than the limited modified spatial sector, based on the spatially extended sound source data and the listener data and the modification data;

a target data calculator for calculating target rendering data from the one or more rendering data items belonging to the modified limited spatial sector; and

an audio processor for processing an audio signal representing the spatially extended sound source using the target rendering data.

2. Apparatus of claim 1, wherein the modification data is occlusion data, and wherein the potentially modifying object is a potentially occluding object.

3. Apparatus of one of claim 1 or 2, wherein the potentially modifying object has an associated modification function,

wherein the one or more rendering data items are frequency dependent,

wherein the modification function is frequency selective, and

wherein the target data calculator is configured to apply the frequency selective modification function to the one or more frequency dependent rendering data items.

4. Apparatus of claim 3, wherein the frequency selective modification function has different values for different frequencies, and wherein the frequency dependent

one or more rendering data items have different values for different frequencies, and

wherein the target data calculator is configured to apply or multiply or combine a value of the frequency selective modification function for a certain frequency to a value of the one or more rendering data items for the certain frequency.

5. Apparatus of one of the preceding claims, further comprising a storage for storing the one or more rendering data items for a number of different limited spatial sectors, wherein the number of different limited spatial sectors together form the rendering range for the listener.

6. Apparatus of one of the preceding claims, wherein the modification function is a frequency selective low-pass function, and

wherein the target data calculator is configured to apply the low-pass function so that a value of the one or more rendering data items at a higher frequency is attenuated stronger than a value of the one or more rendering data items at a lower frequency.

7. Apparatus of one of the preceding claims, wherein the sector identification processor is configured

to determine the limited spatial sector for the spatially extended sound source based on the listener data and the spatially extended sound source data,

to determine, whether at least a part of the limited spatial sector is subject to a modification by the modifying object, and

to determine the limited spatial sector as a modified spatial sector, when the part is greater than a threshold or when the whole limited spatial sector is subject to the modification by the modifying object.

8. Apparatus of one of the preceding claims,

wherein the sector identification processor is configured to apply a projection algorithm or a ray tracing analysis to determine the limited spatial sector, or to use, as the listener data, a listener position or a listener orientation, or to use, as the spatially extended sound source ,SESS, data, an SESS orientation, an SESS position, or information on a geometry of the SESS.

9. Apparatus of one of the preceding claims,

wherein the rendering range comprises a sphere or a portion of a sphere around the listener, wherein the rendering range is tied to the listener position or listener orientation, and wherein the modified limited spatial sector has an azimuth size and an elevation size.

10. Apparatus of claim 9, wherein the azimuth size and the elevation size of the modified limited spatial sector are different from each other, so that an azimuth size is finer for a modified limited spatial sector directly in front of the listener compared to an azimuth size of the modified limited spatial sector more to the side of the listener, or wherein the azimuth size decreases towards a side of the listener, or wherein an elevation size of the modified limited spatial sector is smaller than an azimuth size of the modified limited spatial sector.

11. Apparatus of one of the preceding claims, wherein, as the one or more rendering data items, for the modified limited spatial sector, at least one of a left variance data item related to a left head related transfer function data, a right variance data item related to a right head related transfer function ,HRTF, data, and a covariance data item related to the left HRTF data and the right HRTF data is used.

12. Apparatus of one of the preceding claims, wherein the sector identification processor is configured to determine a set of elementary spatial sectors belonging to the spatially extended sound source and to determine, among the set of elementary spatial sectors, one or more elementary spatial sectors as the limited modified spatial sector, and

wherein the target data calculator is configured to modify the one or more rendering data items associated with the limited modified spatial sector using the modification data to obtain combined data, and to combine the combined data

with rendering data items of one or more elementary spatial sectors of the set of elementary spatial sectors being different from the limited modified spatial sector and being not modified or modified in a different way compared to the modification for the limited modified spatial sector.

13. Apparatus of claim 12, wherein the sector identification processor is configured to classify the set of elementary spatial sectors into different sector classes based on characteristics associated with the elementary spatial sectors,

wherein the target data calculator is configured to combine the rendering data items of the elementary spatial sectors in each class to obtain a combined result for each class, if more than one elementary spatial sectors is in a class, and to apply a specific modification function associated with at least one class to the combined result of this class to obtain a modified combination result for this class, or

to apply the specific modification function associated with at least one class to the one or more data items of the one or more elementary spatial sectors of each class to obtain modified data items and to combine the modified data items of the elementary spatial sectors in each class to obtain a modified combination result for this class,

to combine the combination result or if available the modified combination result for each class to obtain an overall combination result, and

to use the overall combination result as the target rendering data or to calculate the target rendering data from the overall combination result.

14. Apparatus of claim 13,

wherein the characteristic for an elementary spatial sector is determined as being one of a group comprising an occluded elementary spatial sector involving a first occlusion characteristic, an occluded elementary spatial sector involving a second occlusion characteristic being different from the first occlusion characteristic, an unoccluded elementary spatial sector having a first distance to the listener, and an unoccluded elementary spatial sector having a second

distance to the listener, wherein the second distance is different from the first distance.

15. Apparatus of one of claims 8 to 14, wherein the target data calculator is configured to modify or combine frequency dependent variance or covariance parameters as the rendering data items to obtain, as the overall combination result, an overall combined variance or an overall combined covariance parameter, and

to calculate at least one of an inter-aural or inter-channel coherence cue, an inter-aural or inter-channel level difference cue, an inter-aural or inter-channel phase difference cue, a first side gain, or a second side gain as the target rendering data, and

wherein the audio processor is configured for processing the audio signal using at least one of the inter-aural or inter-channel coherence cue, the inter-aural or inter-channel level difference cue, the inter-aural or inter-channel phase difference cue, a first side gain, or a second side gain as the target rendering data.

16. Method of synthesizing a spatially extended sound source, comprising:

receiving a description of an audio scene, the description of the audio scene comprising spatially extended sound source data on the spatially extended sound source and modification data on a potentially modifying object, and receiving a listener data;

identifying a limited modified spatial sector for the spatially extended sound source within a rendering range for the listener, the rendering range for the listener being larger than the limited modified spatial sector, based on the spatially extended sound source data and the listener data and the modification data;

calculating target rendering data from the one or more rendering data items belonging to the modified limited spatial sector; and

processing an audio signal representing the spatially extended sound source using the target rendering data.

17. Computer program for performing, when running on a computer or a processor, the method of claim 16.

18. Audio scene generator for generating an audio scene description, comprising:

a spatially extending sound source data generator for generating SESS data of the spatially extended sound source.

a modification data generator for generating modification data on a potentially modifying object; and

an output interface for generating the audio scene description comprising the SESS data and the modification data.

19. Audio scene generator of claim 18, wherein the modification data comprises a description of a low pass function, wherein the low pass function comprises an attenuation value for a higher frequency, the attenuation value for the higher frequency representing an attenuation value being stronger compared to an attenuation value for a lower frequency, and wherein the output interface is configured to introduce the description of the attenuation function as the modification data into the audio scene description.

20. Audio scene generator of claim 18 or 19, wherein the modification data comprises geometry data on the potentially modifying object, and wherein the output interface is configured to introduce the geometry data on the potentially modifying object as the modification data into the audio scene description.

21. Audio scene generator of one of claims 18 - 20, wherein the SESS data generator is configured to generate, as the SESS data, a location of the SESS, and information on a geometry of the SESS, and

wherein the output interface is configured to introduce, as the SESS data, the information on the location of the SESS and the information on the geometry of the SESS.

22. Audio scene generator of one of the claims 18 - 21, wherein the SESS data generator is configured to generate, as the SESS data, an information on a size, on a position, or on an orientation of the spatially extended sound source, or waveform data for one or more audio signals associated with the spatially extended sound source, or

wherein the modification data calculator is configured to calculate, as the modification data, a geometry of a potentially modifying object such as a potentially occluding object.

23. Method of generating an audio scene description, comprising:

generating spatially extending sound source data of the spatially extended sound source;

generating modification data on a potentially modifying object; and

generating the audio scene description comprising the SESS data and the modification data.

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

25. Audio scene description, comprising:

spatially extended sound source data, and

modification data on one or more potentially modifying objects.

26. Audio scene description of claim 25, implemented as a transmitted or stored bitstream, wherein the spatially extended sound source data represents a first bitstream element, and wherein the modification data represents a second bitstream element.