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United States Patent [19]
Lindemann

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[54] **AUDIO SIGNAL SYNTHESIS SYSTEM
BASED ON PROBABILISTIC ESTIMATION
OF TIME-VARYING SPECTRA**

[57] **ABSTRACT**

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The present invention describes methods and means for estimating the time-varying spectrum of an audio signal based on a conditional probability density function (PDF) of spectral coding vectors conditioned on pitch and loudness values. Using this PDF a time-varying output spectrum is generated as a function of time-varying pitch and loudness sequences arriving from an electronic music instrument controller. The time-varying output spectrum is converted to a synthesized output audio signal. The pitch and loudness sequences may also be derived from analysis of an input audio signal. Methods and means for synthesizing an output audio signal in response to an input audio signal are also described in which the time-varying spectrum of an input audio signal is estimated based on a conditional probability density function (PDF) of input spectral coding vectors conditioned on input pitch and loudness values. A residual time-varying input spectrum is generated based on the difference between the estimated input spectrum and the "true" input spectrum. The residual input spectrum is then incorporated into the synthesis of the output audio signal. A further embodiment is described in which the input and output spectral coding vectors are made up of indices in vector quantization spectrum codebooks.

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H03G 3/00

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84/627; 84/659; 84/661; 84/663; 84/665

[58] **Field of Search** 84/601-604, 622-626,
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663

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