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### Dynamic compression in hearing aids based on an auditory model

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A multichannel dynamic compression algorithm is proposed that uses a novel nonlinear auditory filterbank which aims at effectively describing the basilar membrane (BM) response to arbitrary signals. It is based on a linear Gammatone filterbank, a subsequent instantaneous compression stage and a frequency-synthesis stage. In order to model the linear response to off-frequency tones and suppression effects from signals below the characteristic frequency (low-side suppression) the compression characteristics is controlled in each filter band by the deviation of the current sub-band instantaneous frequency from the band's center frequency. If the deviation is small, on-frequency components are prominent, and full gain and compression is applied. If the deviation is large, off-frequency components are prominent, and gain and compression is reduced. Simulations of responses to sinusoids as a function of frequency and level at a fixed BM place (i.e., within a fixed filter band) and for all filter bands (i.e., BM excitation patterns) show good correspondence with psychoacoustical excitation pattern models. Responses to two-tone stimuli quantitatively simulate psychoacoustical two-tone suppression. Likewise, nonlinear growth of simultaneous masking is quantitatively modeled. First results show that speech reception in modulated noise may be improved by the system for a subgroup of hearing-impaired subjects.