

Research Title: Design and Implementation of A New Digital Filter for Low-Complexity High-Accuracy Digital Hearing Aids

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ABSTRACT

This research presents an infinite impulse response (IIR) filters design for hearing aid application that consists of lowpass, bandpass, and highpass filters in parallel form. The infinite impulse response filters are designed by hybrid method, i.e., quality factor, gain and center frequency of each filter can be found by modified Genetic Algorithm optimization. Modified Genetic Algorithm is a combination of Genetic Algorithm and Nelder-Mead method, i.e., Genetic Algorithm is used to define the initial value of Nelder-Mead method for solving a problem about randomness of initial value in Nelder-Mead method. Then the biquadratic analog prototype transfer functions are transformed to digital transfer functions using bilinear Pascal matrix. The result of presented filter design can reduce procedure of design because these transfer functions can skip a frequency transformation and can reduce the computational complexity cause of use second order filter. The method can be compensated each hearing loss pattern for higher accuracy achievement.

Keywords : Variable Filter, Biquadratic, Bilinear Transformation, Nelder-Mead