

A STUDY OF DIGITAL FILTER DESIGN TECHNIQUES

by

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CHAPTER I

INTRODUCTION

This report is primarily concerned with the study of some of the more important design methods that are normally used in the design of digital filters. These methods can be divided into two broad classes, depending upon whether the digital filter of interest is of the FIR (finite impulse response) or the IIR (infinite impulse response) type.

FIR filters can be designed using three well-known methods, which are: (i) the window method, (ii) the frequency sampling method, and (iii) the optimization method. In this report, the window method has been discussed in detail and various design examples are presented. The other two methods are discussed relatively briefly.

Again, two design methods are considered in the case of IIR filters. These are: (i) the impulse invariance method, and (ii) the bilinear transformation method. More attention has been given to the bilinear transformation method since it is used frequently in the practice. Several illustrative examples are presented, including one related to bandpass filters in the low frequency region; 4-8 Hz and 8-12 Hz. These types of filters can be used in the area of EEG (electroencephalogram) signal processing.

This report consists of five chapters. Chapters II and III discuss design techniques of FIR and IIR digital filters respectively. Chapter IV provides a description of some experimental results related to EEG signal processing using IIR filters which are designed via the bilinear transformation technique. Some concluding remarks are included in Chapter V.