## INTRODUCTION TO "NOTES ON THE DESIGN OF OPTIMAL FIR FILTERS"\*

## John Treichler

This work is produced by OpenStax-CNX and licensed under the Creative Commons Attribution License  $2.0^\dagger$ 

## Introduction

A recurring technical task in the development of digital signal processing products and systems is the design of finite-impulse-response (FIR) digital filters. Fortunately some excellent software packages exist for the automatic synthesis of impulse responses for such filters, many of them based on the now-famous Parks-McClellan algorithm [2]. Unfortunately, there is still some mystery about how to use the software and, equally important, how to estimate impulse response lengths short of actually designing the filter itself. This technical note primarily addresses the second problem and indirectly discusses a bit the first. We examine here how to convert a typical filter specification in terms of cutoff frequency, passband ripple, etc., into a reasonably accurate estimate of the length of the impulse response. Not only does this estimate suffice for most design tradeoff exercises, it usually allows the Parks-McClellan routines to be employed only once or twice rather than the multiple times needed when the "cut-and-try" method is used.

<sup>\*</sup>Version 1.3: Sep 15, 2009 5:00 pm +0000

 $<sup>^{\</sup>dagger} http://creativecommons.org/licenses/by/2.0/$