

Lab

Echo Effect

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DSP may be used to manipulate sound to generate effects such as echo effects.

1 Introduction

Echos are generated using delays. Using an IIR filter, an infinite number of echos that are decaying exponentially are generated. Here is an example of an IIR filter for echo generation.

$$H(z) = \frac{z^{-D}}{1 - \alpha z^{-D}} \quad (1)$$

where α is a constant, and D is a delay.

Another Equation that might also generate echos is given by

$$H(z) = \frac{\alpha + z^{-D}}{1 + \alpha z^{-D}} \quad (2)$$

2 Lab

1. Write the frequency response of the echo generated using Equation 1 and plot the magnitude response. Assume a value of D to generate a delay of 300ms using a sampling rate of 48kHz. What should you use for α ?
2. Write the frequency response of the echo generated using Equation 2 and plot the magnitude response. What is the difference between this response and the one from Equation 1.
3. Implement an echo system. Try different values of α and D .