

Thesis Title	Inverse Filter Echo Cancellation
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Candidate	Mr. Amnard Taweesangrunroj
Supervisor	Assoc. Prof. Dr. Ake Chaisawad
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#### Abstract

Echoes and reverberation in a room is a disturbance to human auditory. The received sound becomes unclear. Therefore, the inverse digital filter is used to filter echoes and reverberation out of the received sampling data. The room impulse response is necessary for inverse filter design. This impulse response can be determined by simultaneously transmitting an MLS signal and recording the system's response using a microphone. The MLS signal and recorded signal are used to calculate the room impulse response with fast Hadamard transform. There are two main approaches in inverse filters design which are cepstral and fast deconvolution methods. The experimental study of the effectiveness of both filters to filter out echoes and reverberation of received signal compare with commercial sound absorber showed that both inverse filters are more effective. Furthermore, both filters can equalize the impulse of direct sound approach to unit impulse and equalize the frequency response to 0 dB up to Nyquist rate. From the experimental results conducted in office room, inverse filter designed by fast deconvolution method can filter out echoes from recorded speech more effective than cepstral method because of its very small value of error energy and equalize nearly the same level of output signal as transmitted signal. Even though this method takes more time for calculation than cepstral method.