A Study On Pitch Detection
in Time-Frequency Hybrid Domain

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Abstract. In this paper, we proposed a new method that can improve the accuracy of cepstrum pitch detection and can reduce the processing time. We control the phase information of cepstrum for making the pitch peak maximum. So we extract the exact pitch period easily. We shorten the processing time by omitting the bit-reversing process from the FFT and IFFT computation.

1 Introduction

The accurate pitch extraction is very important in speech signal processing. The accurate pitch extraction is very important in speech signal processing. If we can measure the pitch period accurately, the accuracy of speech recognition can be higher due to the decrement of speaker dependent effect and we can change the characteristic of synthetic voice easily. Because of this importance, various pitch detection methods have been proposed and it can be divided into time domain, frequency domain and time-frequency domain method.

There are ACM, AMDF, parallel processing method etc. in time domain method. It's processing algorithm is very simple but it is difficult to detect accurate pitch period in transition region of speech signal[1]. There are harmonics analysis method, Lifter method and Comb-filtering method etc. It is little affected at the phoneme transition but the large frame size for the high resolution makes the processing time longer and can't reflect the change of pitch period quickly. The time-frequency domain method has the advantages of time domain method and frequency domain method at the same time. But the computation complexity is the main drawback [2].

In this paper, we propose a new method that can improve the accuracy of cepstrum pitch detection method and can reduce the processing time. We adjust the phase information of cepstrum for making the pitch peak maximum so we extract the exact pitch period easily. And we shorten the processing time by omitting the bit-reversing process from the FFT and IFFT computation.

2 Enhanced Hybrid domain Pitch Detection

If a signal is composed of three signals, the different phase of signals make the waveform complicate as shown in Fig. 1(b). This fluctuation of signal makes the pitch