# TABLE OF CONTENTS

Abstract

Table of contents

List of Figures

List of Tables

List of Photographs

List of Abbreviations &Notations

List of symbols

Chapters

1. **Introduction**

   1.1 Brief over view

   1.2 Motivation

   1.3 Research objective and requirements

   1.4 Contribution of the thesis

   1.5 Organization of the thesis

2. **Literature survey**

   2.1 Summary

3. **Speech Analysis**

   3.1 Introduction to speech analysis

   3.2 Short-time speech analysis

      3.2.1 Windowing

   3.3 Time domain parameters

      3.3.1 Short-time averaging zero crossing rate

      3.3.2 Short-time autocorrelation

   3.4 Frequency domain parameters

      3.4.1 Filter bank analysis

      3.4.2 Short–Time Fourier transform
3.5 Linear predictive coding
   3.5.1 The least square autocorrelation method
   3.5.2 Least square covariance method
3.6 Pitch prediction and detection
3.7 Summary

4. Introduction to different speech coders
   4.1 Introduction to properties and production of speech
   4.2 Evaluation of speech coders
   4.3 Speech coding methodology
      4.3.1 Waveform coders
         4.3.1.1 Pulse code modulation [PCM]
         4.3.1.2 Adaptive pulse code modulation [APCM]
         4.3.1.3 Delta modulation [DM]
         4.3.1.4 Adaptive pulse code modulation [ADPCM]
         4.3.1.5 Differential Pulse code modulation [DPCM]
      4.3.2 Vocoder
      4.3.3 Hybrid Coders
         4.3.3.1 Frequency domain hybrid coders
            4.3.3.1.1 Subband coding technique [SBC]
            4.3.3.1.2 Adaptive transform coder [ATC]
         4.3.3.2 Time domain hybrid coders
            4.3.3.2.1 Adaptive predictive coding [APC]
            4.3.3.2.2 Residual excited linear predictive coding [RELP]
            4.3.3.2.3 Multipulse linear predictive coding [MP-LPC]
            4.3.3.2.4 Code excited linear predictive coding [CELP]
            4.3.3.2.5 Vector sum excited linear predictive coding [VSELP]
      4.4 Summary

5. LD-CELP speech coder
   5.1 Introduction
      5.1.1 Outline of LD-CELP algorithm
      5.1.2 Basic LD-CELP Encoder and Decoder
9.1 Conclusion 119
9.2 Future scope for improvement 120

10. References 121
   Appendices 126
   Papers published and presented 140