

Physical modeling and warped linear prediction as complementary experts for audio coding

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Preface

Audio coding has become a topic of considerable research since the 1980s. Systems using wideband audio coding are now ubiquitous in our lives, and as consumers are increasingly becoming participants in the act of content creation, audio coders that transmit data in a physically meaningful form offer an advantage over conventional psychoacoustic methods because they promise improved efficiency and a more meaningful and flexible information stream.

In this thesis, I explore methods of implementing adaptive and specialized experts for the structured audio extensible audio coding format. The thesis comprises 7 chapters and four investigations using simulated audio coders. The first two chapters are concerned with introducing the fields of audio coding, physical modelling and structured audio. The following four chapters each detail an investigation into specialized “expert” audio coders and are written so as to be largely self-contained, although the theoretical material in Chapter 2 provides a background which may be necessary, in some cases, for a deeper understanding.

A version of Chapter 3 also appeared as,

A. Glass, K. Fukudome. Analysis of various warped-LPC techniques using a real-time testing environment, *Proceedings of the Kyushu-Youngnam Joint Conference on Acoustics*, January 25, 2003.

Chapter 4 was published in a special EURASIP’s issue on instrument modelling,

A. Glass, K. Fukudome. Warped linear prediction of physical model excitations with applications in audio compression and instrument synthesis, *EURASIP Journal on Applied Signal Processing* 2004:7, 1036-1044.

Chapter 5 was presented at ICA 2004 as,

A. Glass, K. Fukudome, A waveguide model for weak fingering pressure in plucked string instruments, *Proc. of the 18th Internal Congress on Acoustics*, Kyoto, Japan, 2004.

Chapter 6 is pending publication in the Japanese Acoustical Society's "Acoustical Science and Technology" journal and will appear as,

A. Glass, K. Fukudome, Parameterization and complexity of plucked string models used as complementary coding experts with warped linear prediction.

Part of chapter 6 will also be presented at YKJCA-2005 as,

A. Glass, K. Fukudome, Parameterisation of plucked string models with coded excitations. *Youngnam - Kyushu Joint Conference on Acoustics*, Busan, Korea, 2005.