

ACOUSTICS2008/2793**Timbre transposition based on time-varying spectral analysis of continuous monophonic audio and precomputed spectral libraries**James Beauchamp^a and Mert Bay^b^aUniversity of Illinois , School of Music, 1114 W Nevada, Urbana, IL 61801, USA^bUniversity of Illinois, Dept. of Electrical and Computer Eng., 1406 W Green, Urbana, IL 61801, USA

A sinusoidal model for solo musical sounds consisting of time-varying harmonic amplitudes and frequencies allows for convenient temporal and spectral modifications. With a harmonic model, analysis frames can be grouped by fundamental frequency (F0) and then clustered in terms of their harmonic spectra. The resulting cluster centroid spectra are used as spectral libraries. When continuous audio monophonic passages are analyzed in the form of harmonic components, F0-vs.-time data are used to guide the extraction of parameters from the sound in order to find appropriate library spectra for resynthesis. Two methods for finding appropriate spectra are: 1) best rms match with the incoming spectra and 2) best spectral centroid match. These give similar results, but centroid matching yields smoother spectra over time. Timbre transposition is performed by using a library that belongs to another instrument. We have found that when the target instrument has a unique timbral quality based on its spectrum, the synthesis sounds mostly like that instrument. However, if the target instrument's spectral characteristic is not sufficiently differentiated from the source, the source timbral quality may dominate, probably due to its temporal behavior being transmitted. Results will be demonstrated by audio examples.