Homework #6: Laboratory Exercise 6
Due Date: May 31, 2011

Compression Reloaded

Problem 1. [50 Points]

Completion of the following exercises entails making modifications to the compressor plugin 'Compressor', for which source code can be downloaded from the class coursework site.

All necessary materials are contained in the file `lab6.zip` or were handed last week. Solutions for each exercise should be easily compileable and include the source files `Compressor.cpp` and `Compressor.hpp` suitably modified. Additional write-up is required for some sections of this problem.

1(a) [20 Points] Modify the compressor from last week to use a Peak detector so that the release becomes program dependent (feel free to reuse parts of the code from last week). Make the release behavior such that the release time is approximately one second following a sustained high input level, and make the release time following transients controllable using the existing slider for release time. Turn in plots showing the compressor's response to the signal `tdiff.wav`, with the fast release component set to 100mS.

1(b) [15 Points] Add a soft knee to the compressor's static compression function. Add a control so that the width of the soft knee can be set between zero and twenty dB.

1(c) [15 Points] Using the RMS detector from last week, convert the compressor into a noise gate. Use the existing ratio control to control the plugin's downwards expansion ratio.

Problem 2. [60 Points]

For this problem, you will be asked to analyze the mystery plugin `DRC.vst`. You may create any test signals you need to analyze the plugin, and may use MATLAB to study the output of the plugin.

2(a) [10 Points] Determine the threshold of compression and the compression ratio.

2(b) [15 Points] Write pseudo-code for the static gain functions Φ_F and Φ_B that would be needed to implement this compressor using feedforward or feedback topologies.

2(c) [**10 Points**] Determine whether the plugin uses RMS or peak detection.

2(d) [**10 Points**] Determine the approximate attack and release times for this plugin.

2(e) [**15 Points**] Write pseudo-code for the signal estimator that would be necessary to implement this plugin for the feedforward case and the feedback case.

Hint: Unlike many audio-processing devices, the mystery plugin DRC will support the entire spectral band from DC to the Nyquist limit.