APPENDIX B

pspectrum.m

```
%
% FUNCTION pspectrum
%
% Display the sound power spectrum (in linear and logarithmic scales)
%

function r = pspectrum(s, fs)
  l = length(s);
  m = 100;
  n = 256;

  nbFrame = floor((l - n) / m ) + 1;

%
% Create a matrix M containg all the frames
%
  for i = 1:n
    for j = 1:nbFrame
       M(i, j) = s(((j - 1) * m) + i);
    end
 end

%
% Matrix M created. Now apply HAMMING window and store in matrix N. Column
vectors of N are
% the original frame vectors transformed by the Hamming window filter
%
  h = hamming(n);
  N = diag(h) * M;

%
% Now apply FFT and create a new matrix M2 where the column vectors are the
FFTs of the
% column vectors of N. The elements of column matrix M2 contain the frames
of the original
% signal, filtered by the Hamming window and transformed with the FFT. The
elements of M2
% are complex numbers and symmetrical because FFT was used to transform the
data.
%
% Each column in M2 is a power spectrum of the original signal
%
  for i = 1:nbFrame
      M2(:,i) = fft(N(:, i));
  end

 t = n / 2;
```

```
 tm = length(s) / fs;
subplot(121);
imagesc([0 tm], [0 fs/2], abs(M2(1:t, :)).^2), axis xy;
title('Power spectrum (Linear)');
xlabel('Time [s]');
ylabel('Frequency [Hz]');
colorbar;

subplot(122);
imagesc([0 tm], [0 fs/2], 20*log10(abs(M2(1:t, :)).^2)), axis xy;
title('Power spectrum (Logarithmic)');
xlabel('Time [s]');
ylabel('Frequency [Hz]');
colorbar;

r=1;

%
% END OF FUNCTION pspectrum
%
```