

Sample Champion - Application note # 12

Reverberation Time computation by using the reverse-time integrated Impulse Response

Reverberation time measurements can be made by using the MLS method and a peculiar analysis technique, commonly called Schroeder Integration. This way of measuring sound decay was introduced firstly by M.R. Schroeder in two *historical* articles:

- **Schroeder M.R.** *New Method of Measuring Reverberation Time* J. Acoust. Soc. Am.1965
- **Schroeder M.R.** *Integrated-Impulse method measuring sound decay without using impulses* J. Acoust. Soc. Am. Vol. 66(2) 1979

The reverse time integration transforms the normal Room Impulse Response (fig. 1) into a decay plot (fig. 2) where it is possible to evaluate the decay time and consequently the reverberation time (60 dB decay).

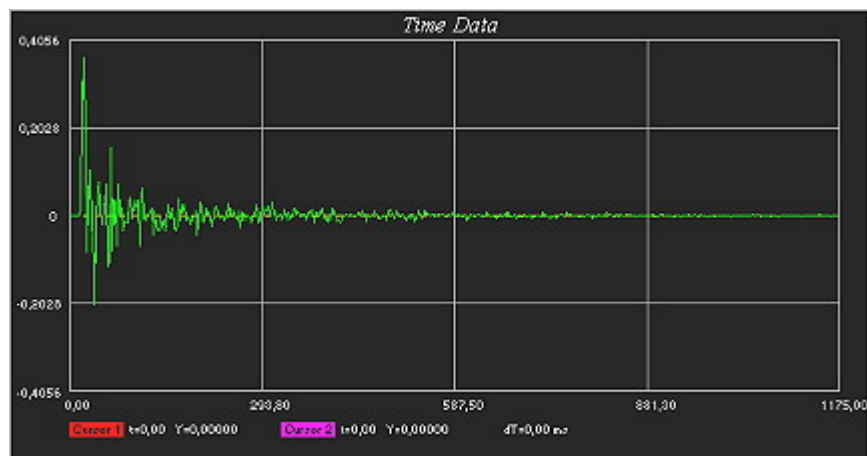


Figure 1 - Room Impulse Response

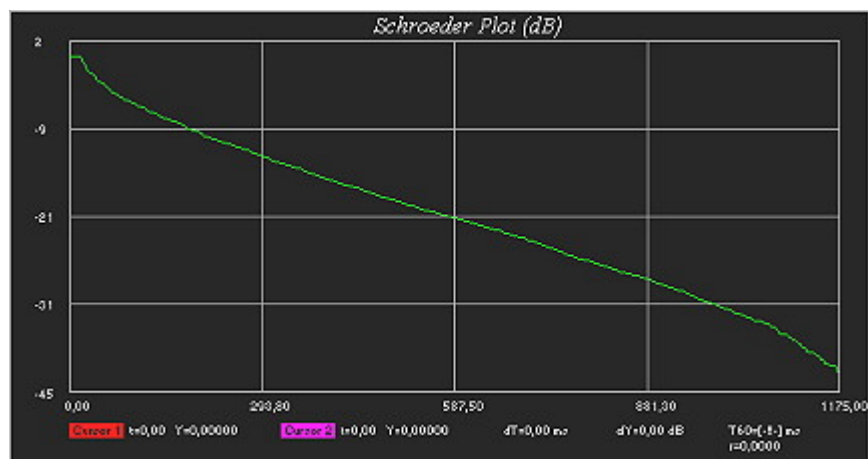


Figure 2 - Schroeder Plot from data in figure 1

The decay plot can be noise compensated, for obtaining a curve more close to a line (the noise decaying is exponential but the Y axis scale is in dB). The Room Acoustics plugin can optionally apply the noise compensation to the Schroeder Plot (see [Application Note #11](#) for some guidelines about using the noise compensation option).

Figure 3 shows the computation of RT30 by using the Room Acoustics plugin of Sample Champion. RT30 is the reverberation time of the room (the time required for a sound decaying of 60 dB) evaluated over a 30 dB decay range in the Schroeder Plot (from -5 to -35 dB), using linear regression techniques.

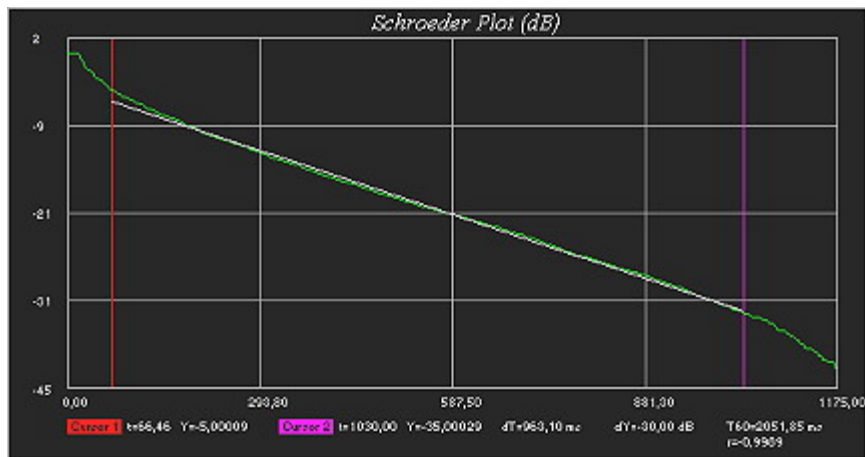


Figure 3 - RT30 computed from Schroeder Plot in figure 2

The value (written in the right lower corner of the graphic screen) is 2051.85 ms ($r=-0.9909$). A value of r close to -1 indicates a good superposition of the regression line with the decay plot.

The Impulse Response can be band filtered for obtaining the reverberation value in a specific band, by using the Room Acoustics plugin. See [Application Note #11](#) about the computation of other acoustical parameters from a Room Impulse Response.