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CONTRASTACIÓN DE ALGORITMOS DE ANÁLISIS DE ESPECTRO SONORO CON UN INSTRUMENTO NORMALIZADO

Federico Miyara[a,b], Susana Cabanellas[b], Vivian Pasch[b], Marta Yanitelli[b], Ernesto Accolti[a], Pablo Miechi[b]

[a]*Laboratorio de Acústica y electroacústica, Universidad Nacional de Rosario, Riobamba 245 bis, 2000 Rosario, Argentina, fmiyara@fceia.unr.edu.ar, http://www.fceia.unr.edu.ar/acustica/*

[b]*Grupo Ruido - Facultad de Arquitectura, Planeamiento y Diseño, Universidad Nacional de Rosario, Riobamba 245 bis, 2000 Rosario, Argentina, http://www.fceia.unr.edu.ar/*

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Abstract. Nowadays there are many measurement instruments commercially available able to perform spectral measurements, either in octave or one third of an octave bands, that comply with the IEC 61260 Standard. However, they are still excessively expensive for most users, even if the prices of highly reliable digital electronic parts are falling. The trend is to manufacture instruments with an embedded programmable computing system and several software modules that allow not only to extend but also to update the instrument capabilities without replacing the hardware. This feature allows reducing hardware development costs, but contrarily as one would suppose, prices keep rising through the high prices of each new software module. An alternative consists in using a minimal cost standard instrument capable of providing a calibrated output signal to a digital recorder. The linear uncompressed PCM signal can subsequently be processed by low-cost computer (or DSP) software, allowing a large variety of possible analysis. Since the purpose is to replace an expensive measurement instrument by a measurement chain comprising several heterogeneous parts, in order to get results that are comparable to those provided by a dedicated meter it is necessary to carry out comparisons using a variety of test signals. In this paper several approaches for band spectral analysis are investigated and compared to the measurements obtained by a standard spectral analyzer (Brüel & Kjaer 2250 with the band analysis software enabled). These methods include Fast Fourier Transform (FFT) with a classification in the frequency domain, infinite impulse response (IIR) filtering combined with under-sampling (multi-rate filtering), finite impulse response (FIR) filtering and FFT filtering using an overlap-add technique. Both systems responses with the same digitally synthesized signals (such as sine waves, sine sweeps and wide band noises) are compared.