ACOUSTICS2008/2879
On the Implementation of Room Acoustics Modeling Software using Digital Waveguide Mesh

José J. Lopez[a], José Escolano[b] and Basilio Pueo[c]
[a]Tech. Univ. of Valencia, Camino de Vera S/N, 46021 Valencia, Spain
[b]University of Jaén, Alfonso X, 28, E-23700 Linares, Spain
[c]University of Alicante, Signals, Systems and Telecommunications, Cta San Vicente del Raspeig s/n, E-03690 Alicante, Spain

The Digital Waveguide Mesh (DWM) method for room acoustic simulation has been introduced in the last years to solve sound propagation problems numerically. However, the huge computer power needed in the modeling of large rooms and the complexity to incorporate realistic boundary conditions has delayed their general use, being restricted to the validation of theoretical concepts using simple and small rooms. This paper presents a complete DWM implementation where all the stages needed to analyze a room are discussed. The software starts the analysis from the architectural model of the room importing its geometry directly from a CAD file. After that, it generates the rectangular mesh of individual cells that conforms the volume to be simulated. Next, the time domain recursion is carried out using parallel computer techniques. Also the software includes a serious treatment of boundary conditions using different material with frequency dependence characteristics. Finally, the software can export the results. Additionally, some room simulation examples are presented and analyzed in detail. The work carried out demonstrate how it is possible, with the current power of the personal computer, to start to simulate real rooms with high amount of geometric details and frequency dependent boundary.