Measuring the Sound Intensity and Reflection Coefficients of Materials Inside an Acoustically Designed Classroom (Choir Room), Assisted by a Custom Impedance Apparatus and Modeled by Two and Three Dimensional Models

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The reflection coefficient is a parameter that shows how much a wave is reflected by an impedance discontinuity in the transmission medium and can significantly change sound intensity in rooms (Russel,1997). EG1 was to measure the sound intensity and reflection coefficients of materials inside an acoustically designed classroom (choir room), assisted by a custom impedance apparatus. EG1 was successful, the sound intensity and the reflections coefficients of the choir room were measured. The reflection coefficients were collected using two different custom impedance apparatuses constructed from PVC. EG2 was to use the data produced by the custom impedance apparatus to accurately model the choir room two and three dimensionally. EG2 was successful, the choir room was successfully modeled for all frequencies. Although the actual values were different than the models, both models were similar to each other for both apparatuses; the chances two different models produced similar results are slim, implying the actual data was affected by white noise or another factor. EG3 was to use the accurate two and three-dimensional models, in order to recommend improvements for acoustically deficient rooms (art rooms). EG3 was partially met, both apparatuses and models produced similar results but were significantly different from the actual data that was collected. This could have been because the “stadium effect,” in rooms taller than nine feet, there is echo because they are designed for large crowds to hear sound. In the future, I would like to find a way to minimize white noise caused by the HVAC.

Awards Won:
Fourth Award of $500