



Richard V. Waterhouse, Fellow of the Acoustical Society of America, passed away in San Francisco, CA, on June 18, 2016. Born in Kent, England, he read physics at the University of Oxford, graduating in 1945 and 1949 with BA and MA degrees, respectively, in physics.

Richard immigrated to the United States in 1951 and joined the National Bureau of Standards (NBS) Sound Section. One of his first accomplishments was to develop an electroacoustical instrument to measure and display the cross-correlation coefficient between two points in a reverberant sound field, used for estimating the diffusiveness in the NBS reverberation chamber. While at NBS, his theoretical skills and experimentation led to new methods to predict complex sound fields and wave interference patterns in reverberant spaces. Two fundamental outcomes came from this research: sound power radiated by a source depends on its proximity to the enclosure boundaries and the total sound energy density in the room increases due to boundary sound interference patterns. The latter was formulated into the so-called Waterhouse correction when measuring sound pressure levels distant from room surfaces. His NBS research served as a basis for his dissertation at The Catholic University of America, where he was awarded a PhD in physics in 1959.

Additional work at NBS focused on the practical aspects of laboratory acoustic testing for measuring sound absorption and transmission loss properties in the reverberation chamber. His findings were incorporated into several domestic and international standards. Waterhouse showed that the sound energy varied significantly over the test specimen when measuring sound absorption and the sound energy changed if the sample was within one to two wavelengths of the chamber boundaries. His recommendation was that the test specimen be placed in the center of the floor in the reverberation chamber. For transmission loss measurements,

he proposed microphone positions being no less than $\lambda/2$ from the test chamber boundaries due to interference patterns occurring at the boundary edges.

In 1961, Richard joined the Physics Department at American University in Washington, DC. He continued his research on complex sound fields in enclosures through the mid-1970s, focusing on sampling statistics and modal behavior in diffuse sound fields. In the early 1980s, he worked on computing and displaying scalar sound pressure fields and vector sound intensity fields scattered by spheres and cylinders. Richard retired from American University as a Professor Emeritus in 1986 but continued consulting to the US Navy.

Waterhouse published in *The Journal of the Acoustical Society of America* throughout his career. He was an associate editor from 1984 to 1987. The Society awarded him the Wallace Clement Sabine Medal in 1990 “for fundamental contributions to the understanding of sound fields in rooms.”

On a personal note, Richard took great interest in my educational objectives and generously offered guidance when I was seeking employment in acoustics. For this, I shall be forever grateful.

Selected Articles by Richard V. Waterhouse

- Waterhouse, R. V. (1955). Interference patterns in reverberant sound fields. *The Journal of the Acoustical Society of America* 27, 247-258.
- Waterhouse, R. V. (1958). Output of a sound source in a reverberation chamber and other reflecting environments. *The Journal of the Acoustical Society of America* 30, 4-13.
- Waterhouse, R. V. (1967). Statistical properties of reverberant sound fields. *The Journal of the Acoustical Society of America* 43, 1436-1444.
- Waterhouse, R. V., and Cook, R. K. (1965). Interference patterns in reverberant sound fields II. *The Journal of the Acoustical Society of America* 37, 424-428.
- Waterhouse, R. V., and Lubman, D. L. (1970). Discrete versus continuous space averaging in a reverberant sound field. *The Journal of the Acoustical Society of America* 48, 1-5.

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