

# EXCESS ATTENUATION OF AN ACOUSTIC BEAM BY TURBULENCE

**K. SRIDEVI, K. MADHU and M. PURNACHANDRA RAO**

*Department of Systems Design, Andhra University, Visakhapatnam – 530 003*

*Abstract: A theory based on the concept of a spatial sinusoidal diffraction grating is presented for the estimation of the excess attenuation in an acoustic beam. The equation of the excess attenuation coefficient shows that the excess attenuation of an acoustic beam not only depends on the turbulence but also depends on the application parameters such as the beam width, the beam orientation and whether for forward propagation or back scatter propagation.*

## 1. INTRODUCTION

Tyndall (1874) discovered the phenomenon of sound scattering by turbulence in 1874. After a long silence, acoustic scattering theory started to build up in the 1940s (Obukhov, 1941; Blokhintsev, 1946).

## 2. EXPERIMENT

Since the mid 1970s experiments on measuring  $C_T^2$  or  $C_T^2$  plus  $C_V^2$  were carried out by many scientists (Neff, 1975; Haugen and Kaimal, 1978).

## 3. RESULTS

The excess attenuation is not an intrinsic property of just the atmosphere. It depends not only on the inhomogeneity of the refractive index in the atmosphere but also on the sound beam pattern.

## 4. CONCLUSIONS

The total excess attenuation can be neglected for path lengths less than 100 m but increases rapidly with the propagating distance.

## ACKNOWLEDGEMENT

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