Acoustic Noise Propagation @model

While propagating through the homogeneuos medium the different frequencies will decay at different rate $\alpha(f)$ and if noise sensor is located at $\mathbf{r}_0 = \{0, 0, 0\}$ and the noise source is located at $\mathbf{r}$ then the acoustic energy decay:

(1) $$N(r) = N(0) \cdot \exp[-\alpha(f) r]$$

The decay decrement $\alpha(f)$ is growing with frequency: $\frac{d\alpha}{df} > 0$.

There is no universal model but it can be approximated by a linear-quadratic dependance:

(2) $$\alpha(f) = \alpha_1 \cdot f + \alpha_2 \cdot f^2, \quad \alpha_1 > 0, \alpha_2 > 0$$

with α_1 and α_2 having much slower dependance on frequency than $\alpha(f)$ and in most practical cases can be assumed constant.

See also

Physics / Mechanics / Continuum mechanics / Acoustic Noise Propagation