

Φυσική εξασθένιση

Εξίσωση SONAR

Εισαγωγή στην Ακουστική Ωκεανογραφία

$$\frac{d|p|}{dx} = -a_e |p|$$

Επίπεδα κύματα

$$|p| = |p_i| \exp(-a_e x)$$

$$|p_i| = |p_0| \frac{r_0}{r}$$

Σφαιρικά κύματα

$$|p| = |p_0| \frac{r_0}{r} \exp[-a_e (r - r_0)]$$

$$p(r, t) = \frac{b_c}{r} \exp[-a_e (r - r_0)] \exp[i(kr - \omega t)]$$

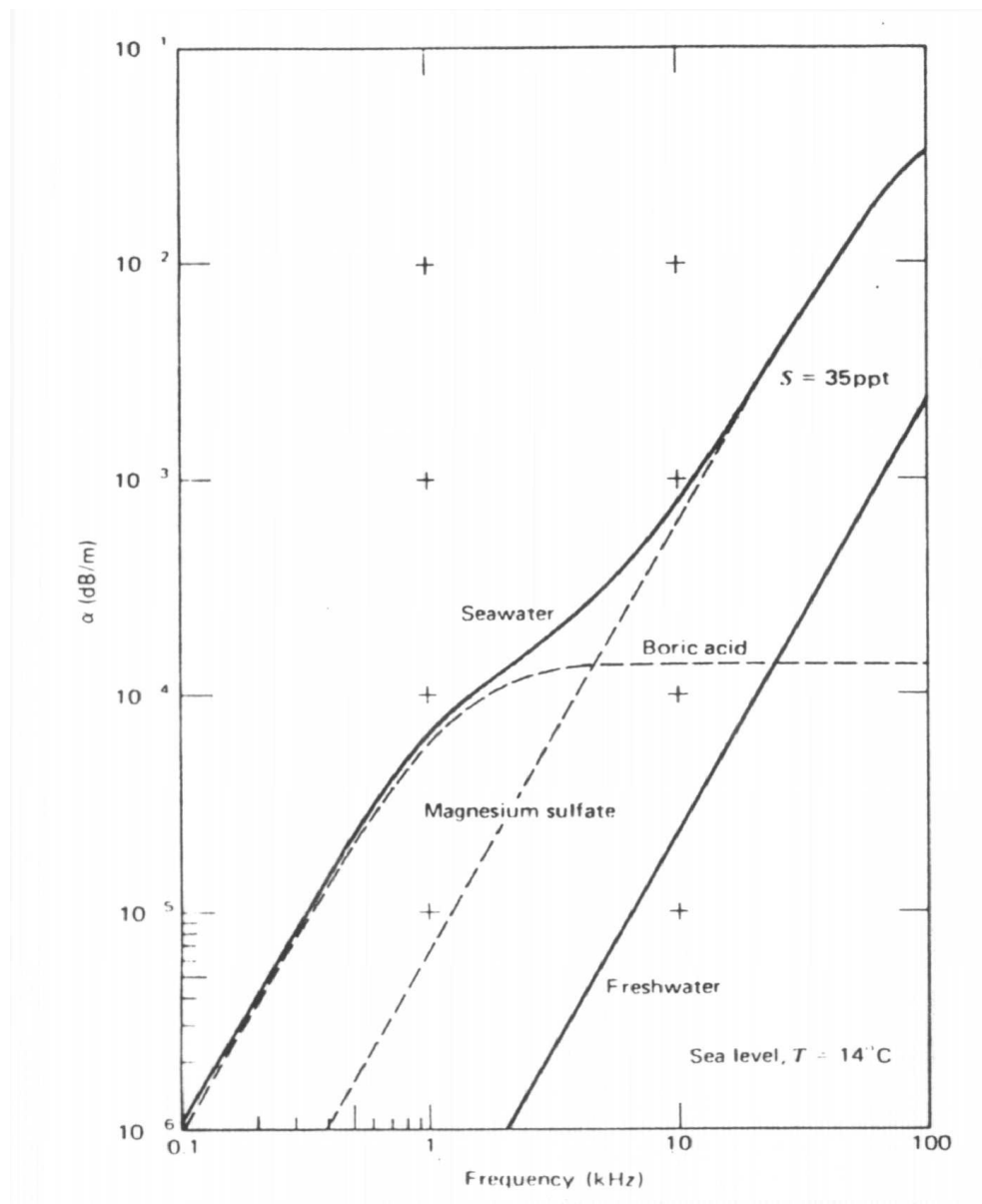
$$p(r, t) = \frac{b_c}{r} \exp[-a_e r] \exp i(kr - \omega t)$$

$$k_c = k + ia_e \quad \text{nep/m}$$

$$p(r, t) = \frac{b_c}{r} \exp i(k_c r - \omega t)$$

$$TL = 20 \log_{10} \left| \frac{p_i}{p} \right| = a_e x (20 \log_{10} e) = 8,686 a_e x$$

$$a = 8,686 a_e \quad \text{dB/m}$$



Εξίσωση SONAR

$$SPL = SL - TL$$

$$SL = 10 \log_{10} \left| \frac{p_0}{p_{ref}} \right|^2$$

$$|p|^2 = \frac{|p_0|^2 r_0^2 \rho c \sin \theta_0 \Delta \theta}{\rho_0 c_0 r L} 10^{-a(R-r_0)/10}$$

$$TL = 20 \log_{10} \frac{r}{r_0} - 10 \log_{10} \frac{\rho c}{\rho_0 c_0} + 10 \log_{10} \frac{L}{r_0 \sin \theta_0 \Delta \theta} + a(R - r_0)$$

$$SPL = SL - TL - BL$$

$$SPL = SL - TL - BL - DI$$

$$SPL = SL - TL_1 + TS - TL_2$$