

Worked example

$$1. \quad I_{dir} = \frac{W_{src}}{4\pi r^2} = 0.02 \text{ Wm}^{-2} \quad [1.7(10)]$$

$$SIL_{dir} = 103 \text{ dB} \quad [16(8)]$$

$$2. \quad S = 2 \times [7 \times 5 + 7 \times 3 + 5 \times 3] \\ = 2 \times (35 + 21 + 15) \\ = 2 \times 71 = 142$$

$$A = S\alpha = 142 \times 0.1 = 14.2 \text{ sabin} \quad [P.7]$$

$$E_{\infty} = \frac{4 W_{src}}{S\alpha c} = 8.3 \times 10^{-4} \text{ Jm}^{-3} \quad [P.9(8)]$$

$$3. \quad p_{rms}^2 = E_{\infty} \rho_0 c^2 \quad [P.5(2)]$$

$$SPL_{rev} = 10 \log_{10} \left(\frac{4(1-\alpha) W_{src} \rho_0 c}{S\alpha p_{ref}^2} \right) \quad [P.16]$$

$$= 10 \log_{10} \left(\frac{4(1-\alpha) W_{src}}{S\alpha I_{ref}} \right) = 114 \text{ dB}$$

$$4. \quad A' = A + 0.5 \times 7 \times 5 \\ = 14.2 + 17.5 = 31.7 \text{ sabin}$$

$$\alpha' = \frac{A'}{S} = 0.223$$

$$E_{\infty}' = \frac{4 W_{src}}{S\alpha' c} = 3.7 \times 10^{-4} \text{ Jm}^{-3}$$

$$[P.7] \quad SPL'_{rev} = 10 \log_{10} \left(\frac{4(1-\alpha') W_{src}}{S\alpha' I_{ref}} \right) = 109.9 \text{ dB}$$