

Exercise 3

Show that

$$\begin{aligned}\frac{1}{2\pi^2 cr} \int_0^\infty \sin kct \sin kr \, dk &= \frac{1}{8\pi^2 cr} \int_{-\infty}^\infty [e^{ik(ct-r)} - e^{ik(ct+r)}] \, dk \\ &= \frac{1}{4\pi cr} [\delta(ct-r) - \delta(ct+r)].\end{aligned}$$