Double slit

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Solution: *The Fourier transform of $A(z) = \chi_{[-d/2-\Delta d, -d/2]} + \chi_{[d/2, d/2+\Delta d]}$ is,*

$$B(q) = \int_{-d/2-\Delta d}^{-d/2} e^{\imath q z} dz + \int_{d/2}^{d/2+\Delta d} e^{\imath q z} dz$$

$$= \frac{e^{-iqd/2}}{\imath q}(1 - e^{-iq\Delta d}) + \frac{e^{\imath qd/2}}{\imath q}(e^{\imath q\Delta d} - 1) \simeq 2\Delta d \cos \tfrac{1}{2}qd \ .$$

The intensity is $I(q) = c\varepsilon_0 |B(q)|^2$.