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Wavefunction:

$$\Psi(x, t) = C \cdot e^{i(\omega t - kx)} = C \cdot e^{\frac{i}{\hbar}(Et - px)} \stackrel{\text{Wavepacket}}{=} A(x, t) e^{i(\omega_0 t - k_0 x)} = 2C(k_0) \frac{\sin \left[\left(t \cdot \left(\frac{d\omega}{dk} \right)_{k_0} - x \right) \cdot \Delta k \right]}{\left(t \cdot \left(\frac{d\omega}{dk} \right)_{k_0} - x \right)} = 2C(k_0) \quad (1)$$