

## 1 Interference

$$\begin{aligned} & \sin(kx - wt) + \sin(kx + wt) \\ = & 2\sin\frac{2kx}{2}\cos\frac{2wt}{2} \\ = & \sin(\omega_1 t) + \sin(\omega_2 t) \\ = & 2\sin\left(\frac{\omega_1 + \omega_2}{2}t\right) + 2\cos\left(\frac{\omega_1 - \omega_2}{2}t\right) \end{aligned}$$

$$\begin{aligned} \sin(a) + \sin(b) &= 2\sin\frac{a+b}{2}\cos\frac{a-b}{2} \\ \cos(a) + \cos(b) &= 2\cos\frac{a+b}{2}\cos\frac{a-b}{2} \end{aligned}$$

- This is a standing wave.
- Where is the second wave coming from? The reflection