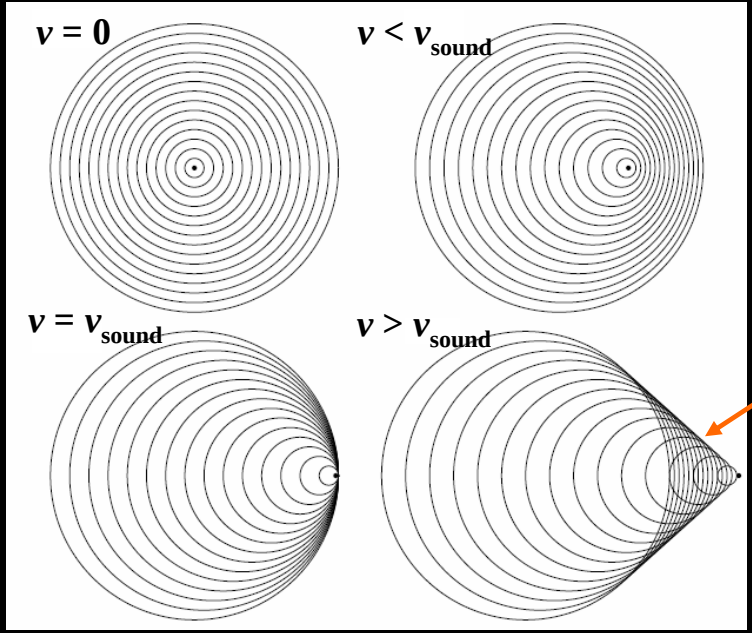
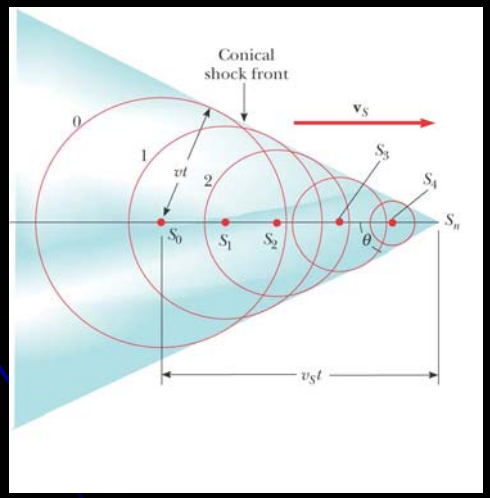
- **Shock waves**



High pressure regions resulting from the piling-up of compressional waves.



Mach number = v_s / v
(v_s > v : supersonic speed)

Chapter 18. Superposition and Standing Waves

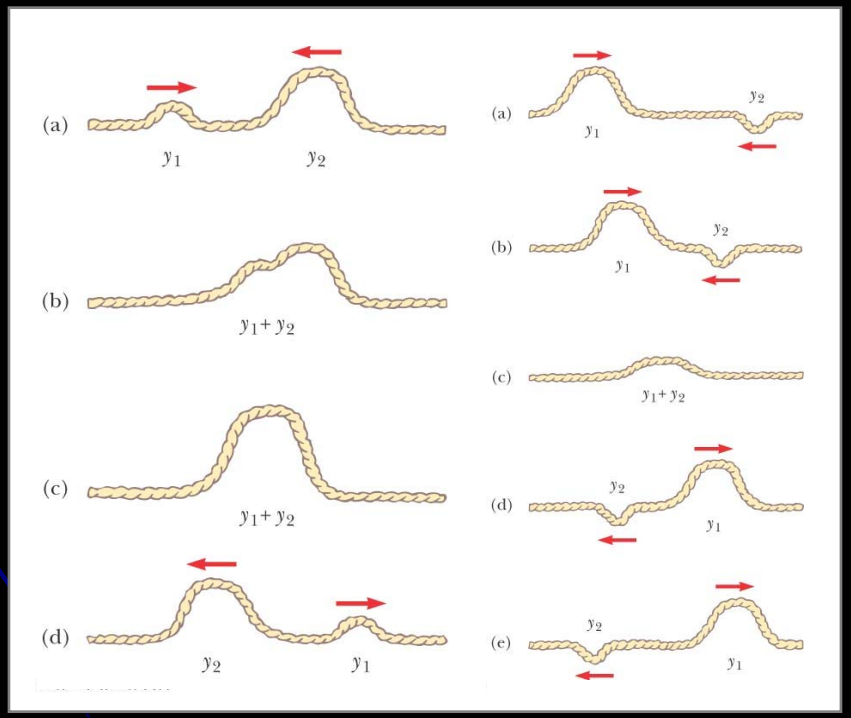
18.1 Superposition and Interference

Principle of Superposition :

When two or more waves pass through the same region of space at the same time, the actual displacement is *the algebraic sum of the separate displacements*.

$$y(x,t) = y_1(x,t) + y_2(x,t) + \ldots$$

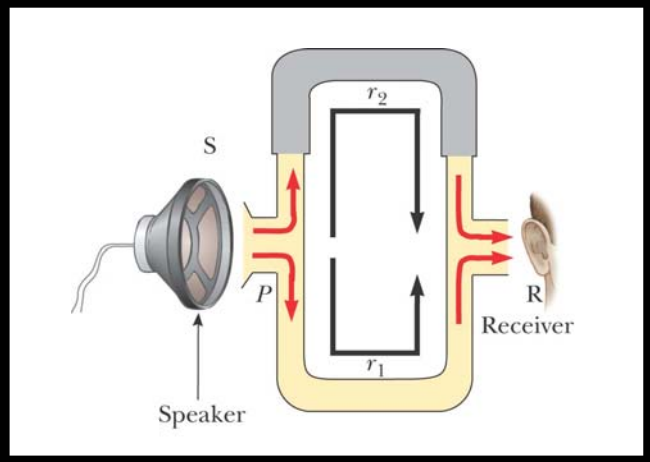
Two pulses traveling on a string in opposite directions pass through each other. When the pulses overlap, the net displacement of the string equals the sum of the displacements produced by each pulse.

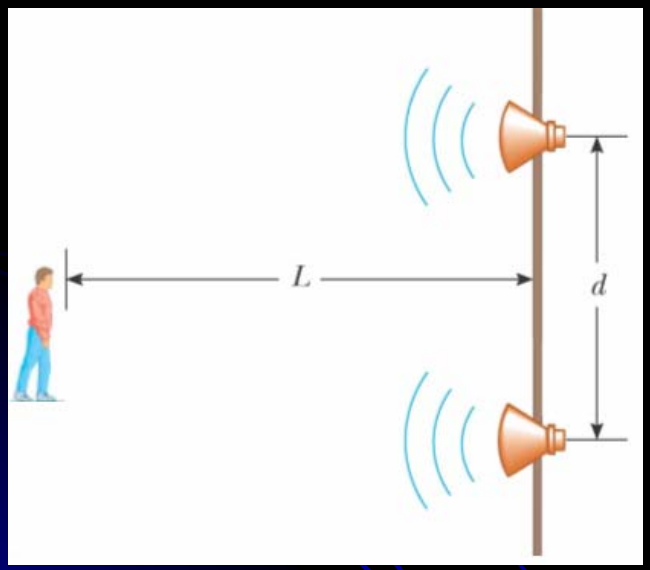


Two pulses traveling in opposite directions and having displacements that are inverted relative to each other. When the two overlap, their displacements partially cancel each other.

Constructive Interference **Destructive Interference**

• Interference of Sound Waves :





An acoustical system for demonstrating interference of sound waves. A sound wave from the speaker (*S*) propagates into the tube and splits into two parts at point *P*. The two waves, which combine at the opposite side, are detected at the receiver (*R*). The upper path length r_2 can be varied by sliding the upper section.

CI : $\Delta r = 2n\,(\lambda/2)$

DI : $\Delta r = (2n + 1)\,(\lambda/2)$

for $n = 0, 1, 2, \ldots$