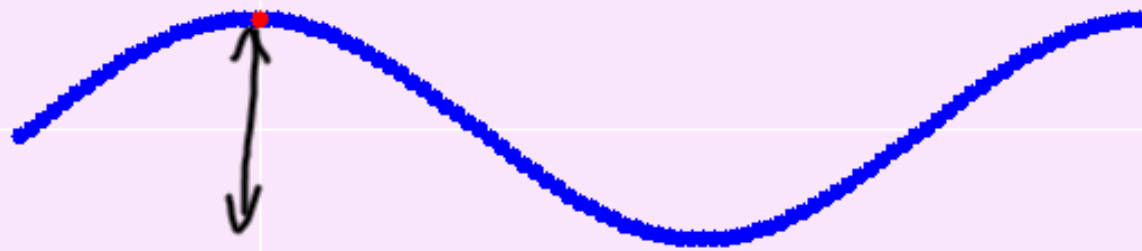


standing transverse with reflection (fixed)

<http://www.ngsir.netfirms.com/englishhtm/TwaveA.htm>

<http://www.walter-fendt.de/ph14e/stwaverefl.htm>

Applet by C.K.Ng



*With wave travels*

Decolorize

Step

Continue

Select a point

Amplitude

Wavelength

Frequency

Freeze

Remove selections



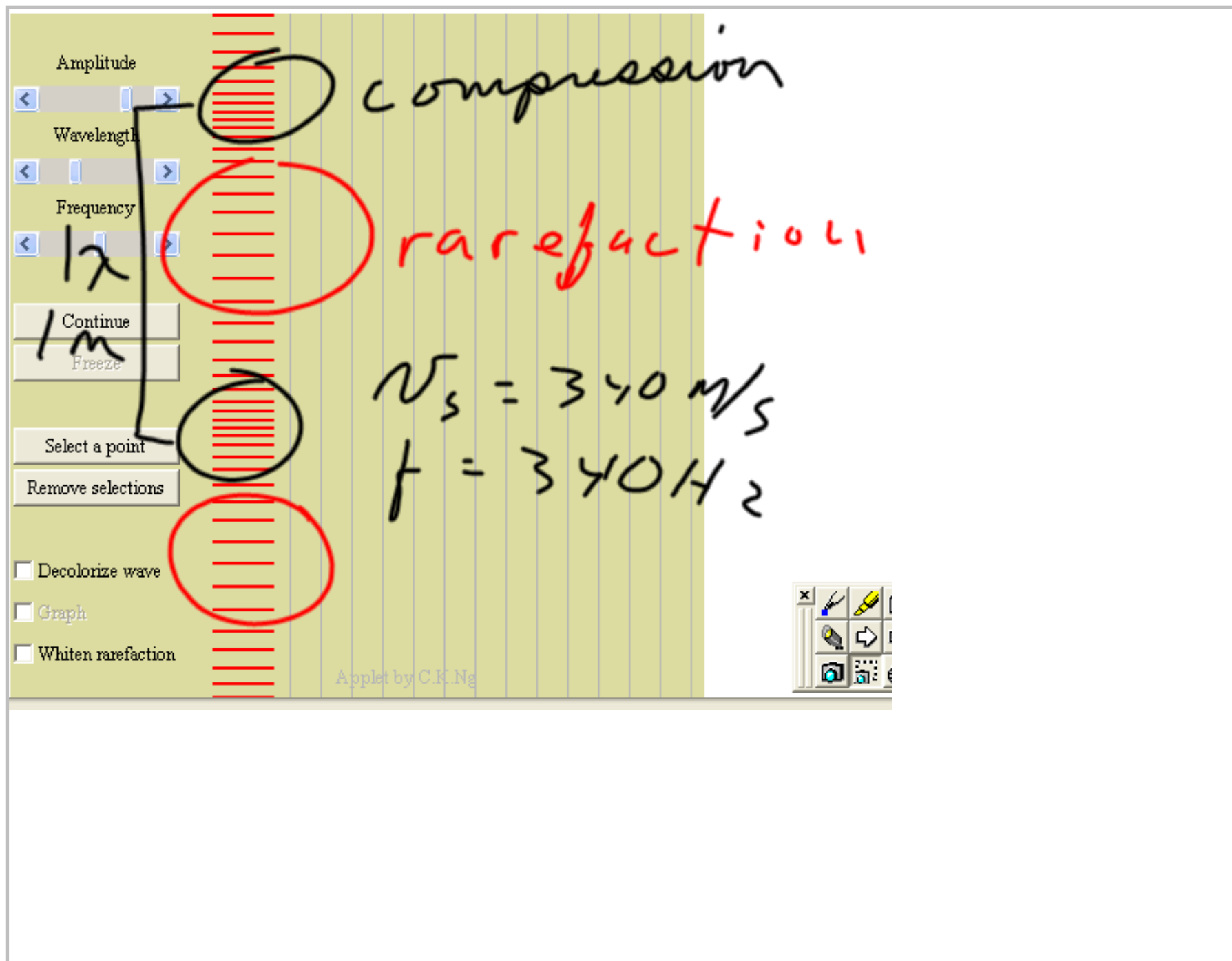
avelling Wave

*Transverse wave*

<http://www.ngsir.netfirms.com/englishhtm/Lwave.htm>

long. wave

<http://www.kettering.edu/~drussell/Demos/waves/wavemotion.html>



fixed and free reflection/transmission

<http://physics.usask.ca/~hirose/ep225/animation/reflection/anim-reflection.htm>

<http://www.kettering.edu/~drussell/Demos/reflect/reflect.html>

boundaries:  
fixed (rigid) - from a slower  
to a faster med.  
open (free) - from a faster to a  
slower medium

Fixed:  
sound air - glass  
air - wall

open:  
sound glass - air

standing waves (mult. loops)

<http://www.ngsir.netfirms.com/englishhtm/TwaveStatA.htm>

<http://physics.usask.ca/~hirose/ep225/animation/standing1/anim-stwave1.htm>

superposition

[http://www.kettering.edu/  
~drussell/Demos/superposition/superposition.html](http://www.kettering.edu/~drussell/Demos/superposition/superposition.html)

doppler effect

<http://www.kettering.edu/~drussell/Demos/doppler/doppler.html>

## Sound

$$P = .5 \text{ W}$$

$$r = 6.0 \text{ m}$$

$$f = 340 \text{ Hz}$$

$$I = ?$$

$$x = ?$$

$$I = \frac{P}{A}$$

$$I = \frac{P}{4\pi r^2}$$

$$I = \frac{.5 \text{ W}}{4\pi (6 \text{ m})^2}$$

$$I = .0011 \text{ W/m}^2$$

← surface area of sphere

$$I = 2\pi^2 \rho v f^2 x_0^2$$

$$x_0 = \sqrt{\frac{I}{2\pi^2 \rho v f^2}}$$

$$x_0 = \sqrt{\frac{.0011 \text{ W/m}^2}{2\pi^2 (1.29 \text{ kg/m}^3) 340 \text{ m/s} (340 \text{ Hz})^2}}$$

$$x_0 = 1.04 \times 10^{-6} \text{ m}$$

distance air particles vibrate as wave pass through.

same wave in steel!  
cyl. shaped bar

$$rad = 2.0 \text{ cm}$$

$$I = \frac{P}{A} = \frac{.5 \text{ W}}{\pi (.02 \text{ m})^2}$$

$$I = 398 \text{ W/m}$$



$$\lambda = \sqrt{\frac{I}{2\pi^2 \rho v f^2}}$$

$$\lambda = \sqrt{\frac{398 \text{ W/m}^2}{2\pi^2 (7900 \text{ kg/m}^3) 5031 \text{ m/s} (340 \text{ m/s})^2}}$$

$$= \sqrt{\frac{E}{\rho}}$$

$$= \sqrt{\frac{200 \times 10^9 \text{ N/m}^2}{7900 \text{ kg/m}^3}}$$

$$= 5031 \text{ m/s}$$

$$\lambda_0 = 2.0 \times 10^{-6} \text{ m}$$

