


Principles Tune-up: How Sharp Are You?

Frederick Kremkau, PhD, Wake Forest University


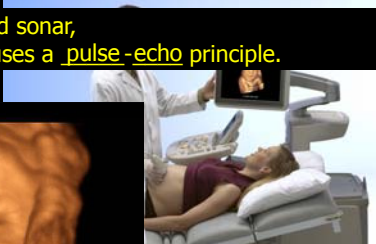
30 questions in 30 minutes

DilbertCartoonist@gmail.com

Spectrum of Difficulty

EASY HARD


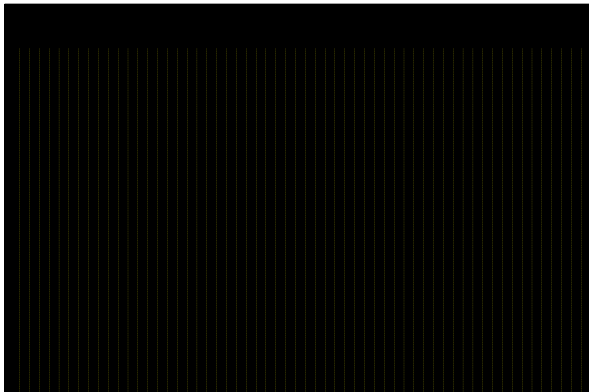
Like radar and sonar, sonography uses a pulse -echo principle.

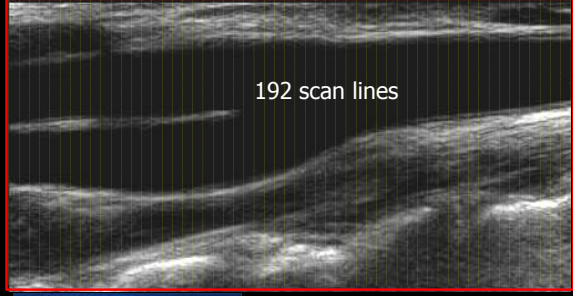
PULSE

ECHOES



SCAN LINE

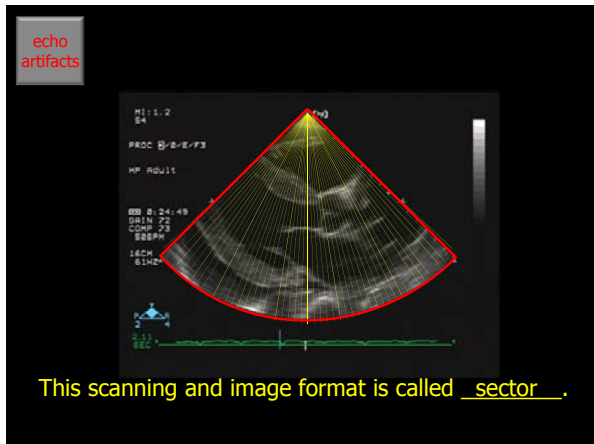



A 2D image contains about 100 to 250 scan lines.

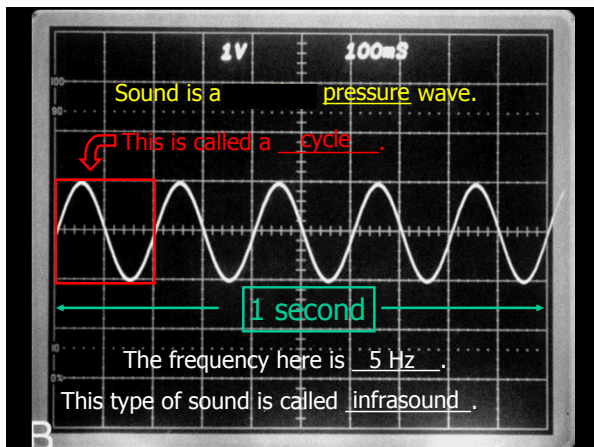


192 scan lines

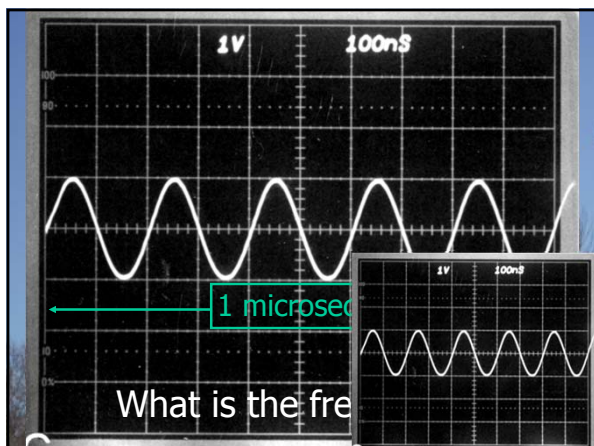


- Ultrasound
- Transducers
- Instruments
- Doppler US



FREQUENCY

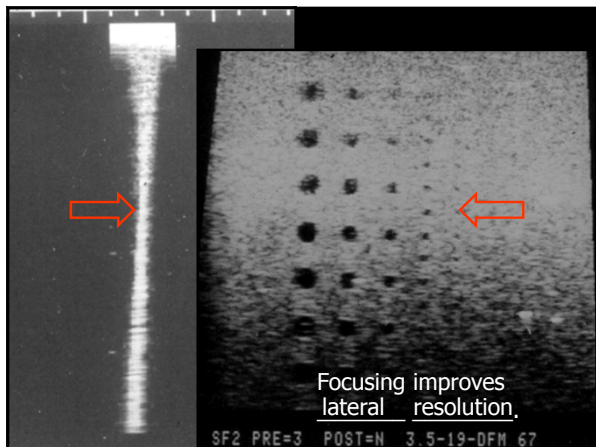
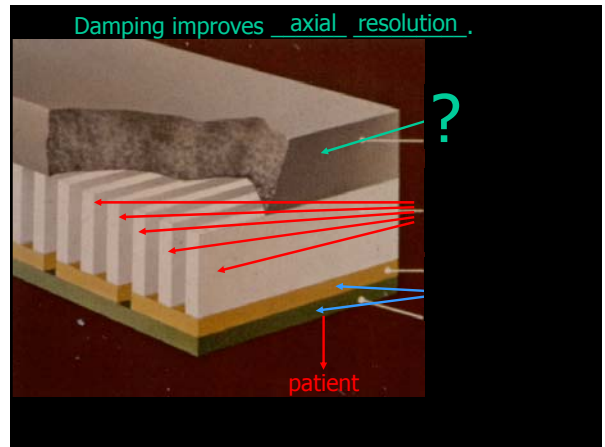
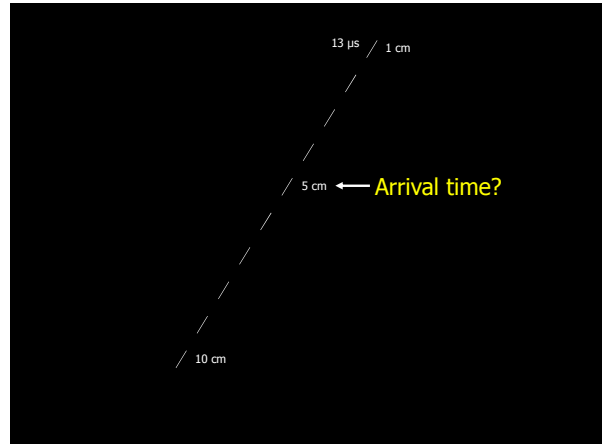
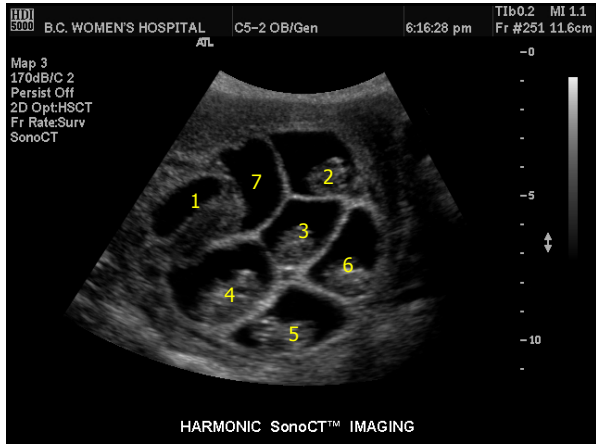
Number of per second.



This form of sound (MHz) is called ultrasound.

beyond large

Tones



Axial and lateral resolutions are aspects of detail resolution.

The other resolutions in imaging are contrast and temporal.

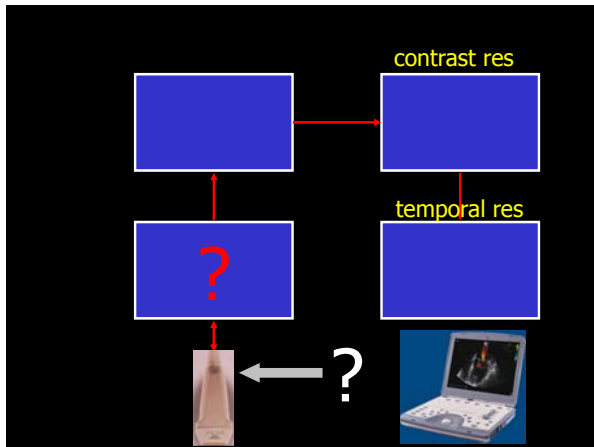
If you missed that one, here is your...

flight home.

hospital visit.

OB sonogram.

southern snowman.



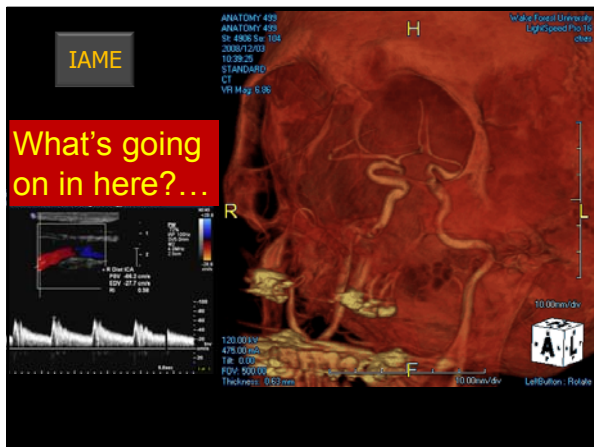
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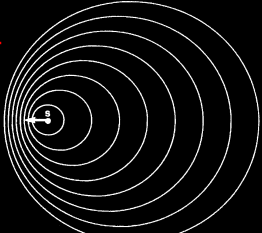



Answer

You just heard Amtrak? histle? ___

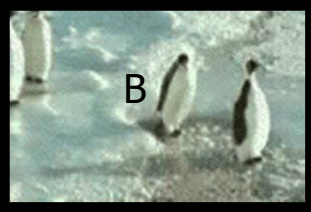
The Doppler Effect is a change in

- a. frequency ←
- b. amplitude
- c. attenuation
- d. wavelength ←
- e. a and d



tip 

If you missed that one, then you are Penguin B...

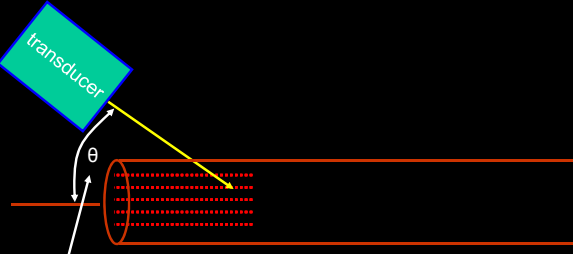


$f_D = f_R - f_T = \frac{v}{\lambda}$

The ? equation.

This is called the Doppler shift.

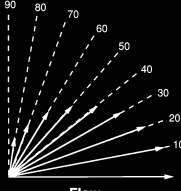
It appears in the Doppler equation as...



This is called the Doppler angle.

As Doppler angle increases, Doppler shift...

1. increases
2. decreases
3. remains constant
4. gets stronger
5. just tell me!

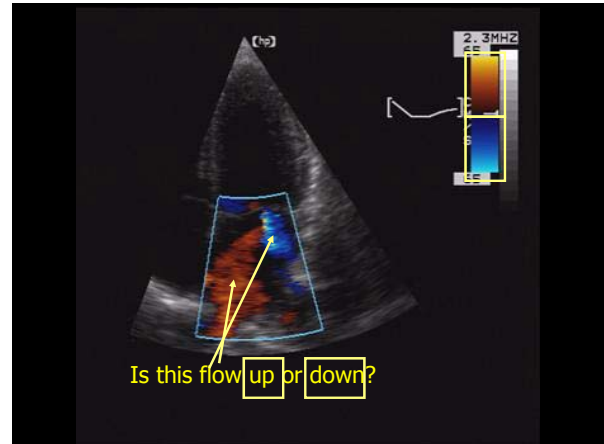
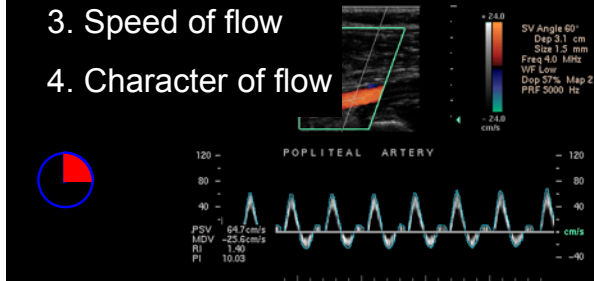


Match the following...

Doppler shift is → estimated.
 Doppler angle is → calculated.
 Flow speed is → measured.

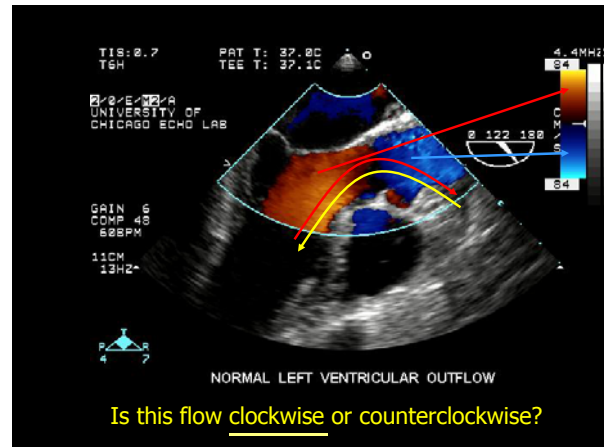
Doppler ultrasound yields four types of information. They are...

1. Presence of flow
2. Direction of flow
3. Speed of flow
4. Character of flow



If you missed that one, this is your next hospital visit...

zapper



On this color-Doppler map, yellow indicates...

1. small positive shift
2. small negative shift
3. large positive shift
4. large negative shift
5. none of the above

If you got that ~~one~~ right, may you have a wonderful Caribbean vacation...

The Doppler spectrum is analyzed by

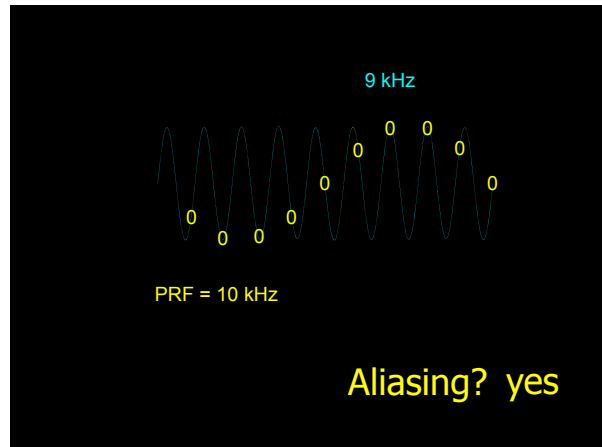
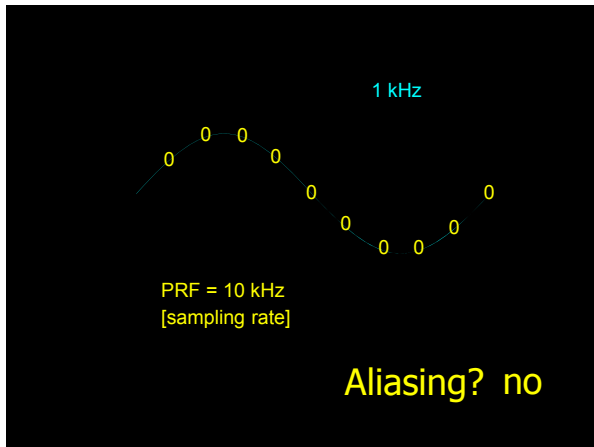
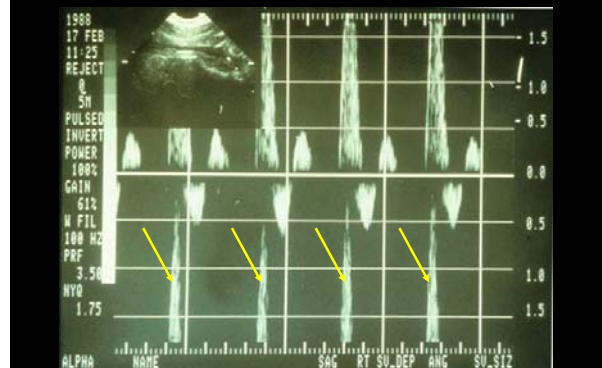
1. DAC
2. ADC
3. ADHD
4. FFT



Time



What is the artifact? Aliasing.

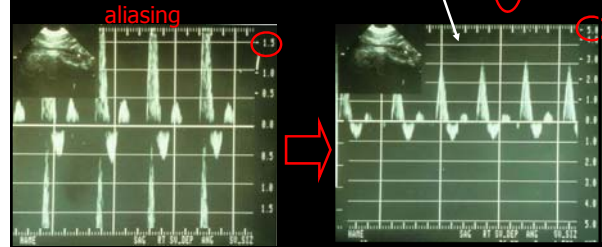


Now, *if* you are female *and* you missed that one...

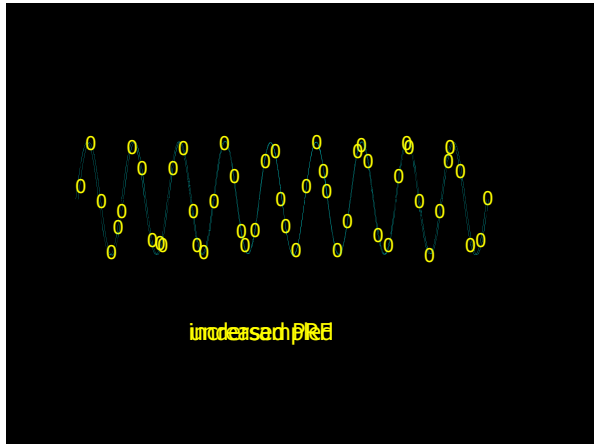


OB exam

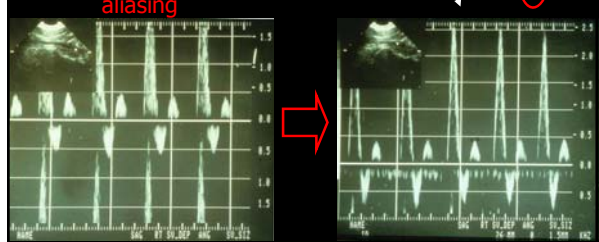
What control was used here? Scale
This eliminated the aliasing [T/F].



Scale increase = PRF (sampling rate) increase.



What control was used here?
This eliminated the aliasing [T/F].



No! Cut and paste... Baseline shift

Gotcha on that one? If so, *and* you are male, here is your next flight...

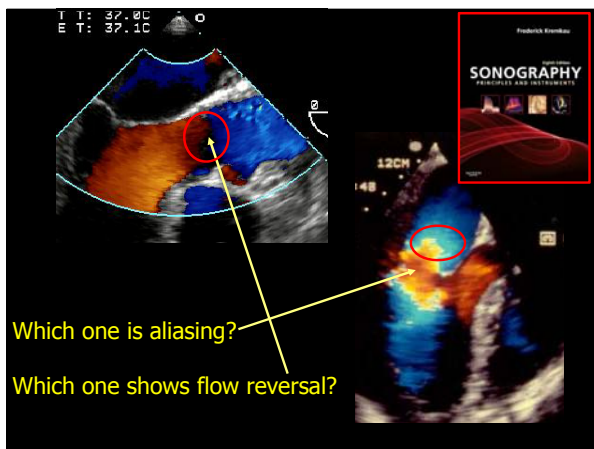
Correcting for Aliasing

- shift baseline up/down
- increase prf (scale)

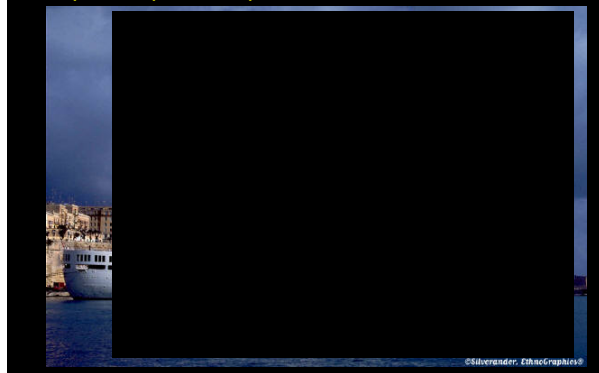
In extreme cases, do both.

Which is preferable to do first?

Shift baseline, then increase scale.



If you get that one right, may you have a wonderful all-expenses-paid European vacation ☺...



Principles Tune-Up



How sharp *were* you?

Principles Tune-Up



Sharpness Index!

...and now how sharp *are* you?

If your sharpness index increased and you are...

male

female

...here is your entertainment for this evening...

