Radiology Techniques Department, College of Medical Technology, The Islamic University, Najaf, Iraq

Theoretical Radiation Physics

Third stage- Radiology Techniques Department

Lecture 3

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Radiation Physics precise specialization

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1.1.1:The periodicity of the diagnostic ultra sound wave

Since the periodic motion is the motion repeats itself continuously , like moving an object on a circular path , the movement of the pendulum back and forth, the movement of the piston back and forth .

Since the molecules of the fluid medium in the tube are affected by the movement of the piston ,so the movement of the particles will be aperiodic motion and this will generate compression and rarefaction regions ,and because these regions repeating themselves continuously ,so their movement is considered cyclical.

Since the movement of the longitudinal wave is arepetitiven compression and rarefaction movement, this means it is a movement repeats itself continuously ,so the longitudinal wave movement is considered aperiodic motion, meaning that the movement of all sound waves which are longitudinal waves including diagnostic ultrasound waves , is considered a periodic motion.

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1.1.2 : One wave cycle

since the movement of the pendulum back and forth for one time represents one cycle of the pendulum or one vibration of the pendulum and the movement of the piston back and forth for one time represents one cycle of the piston , so each compression and rarefaction for one time represents one wave cycle of the longitudinal wave .

1.1.3 : Frequency (f)

since the number of revolution per second of the pendulum represents the frequency of the pendulum , and the number of the revolution per second of the piston represents the frequency of the piston , so the number of wave cycles per second represents the frequency of the longitudinal waves ,meaning that the frequency of the longitudinal waves represents the number of compressions and rarefactions per second .

1.1.4 :Wave length(λ)

The distance in which the disturbance effect appears from compression and rarefaction for

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one wave cycle is called the wave length of the longitudinal wave.

1.1.5 : the wave phase

The word phase refers to every stage that changes from certain properties to other properties, since longitudinal waves are series of alternating compressions and rarefactions in the material medium, and the pressure , density and displacement of the molecules of the medium are in a state of change when we move from the compression region to the rarefaction region , also a change in pressure ,density and displacement occurs when we move from the rarefaction region to the compression region.