

**Radiology Techniques
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Theoretical Radiation Physics

Third stage- Radiology Techniques Department

Lecture 6

By

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Radiation Physics precise specialization

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(Generation and detection of ultra sound waves)

1.1: The piezoelectric phenomenon:

It is the phenomenon of converting mechanical energy into electrical energy and vice versa, i.e. converting electrical energy into mechanical energy. Some crystalline materials have this property (energy conversion), when this material is subjected to compression or expansion, an electric charge appears on the surface of the crystal, and since the polarity that appears on the surface of the crystal in the state of compression is opposite to the polarity that appears on the surface of the crystal in the state of expansion, In this case,



1.2: piezoelectric effect: the mechanical energy was converted into electrical energy, and this process is called the piezoelectric effect,

1.3: revers piezoelectric effect: In this case, the electrical energy was converted into mechanical energy, and this process is called the revers piezoelectric effect.

1.4: Production and detection of ultrasound waves: The process of producing ultrasound depends on the process of converting the electrical energy into mechanical energy, that is meaning depending on the reverse piezoelectric effect, by using a piezoelectric crystal material, And that the process of detecting ultrasound waves depends on the process of converting mechanical energy into electrical energy ,that is meaning depending on the piezoelectric effect, By using a piezoelectric crystal material, so piezoelectric crystal material can be used to product and detect ultrasound waves.

1.5: Ultrasonic transducer:

It is a device that converts energy from one form to another, from electrical energy to mechanical energy in the process of generating waves, and from mechanical energy to electrical energy in the process of detecting waves. Therefore, the sensor group in the sonar device is called the transducer because it generates and detects ultrasound, that is, it performs two types of energy conversion.