

Sonic Spectrum Encyclopedia Article

Sonic Spectrum

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Sonic Spectrum

The sonic spectrum is broken into three basic parts: **infrasound**, audible **sound**, and ultrasound. Infrasound is sound that is below the human threshold of **hearing**, about 20 Hz. Ultrasound is sound that is above the human threshold of hearing at about 20,000 Hz.

Acoustics is the science of sound, usually that of the audible range. Acousticians study how sound is produced, absorbed, reflected, and transmitted by objects. They use this information in a variety of ways, including designing better concert halls, testing musical instruments, and studying the development of hearing and speech.

Infra-acoustics studies are mostly of a geophysical nature. Most seismic **waves**, such as those before and after an earthquake, are infrasonic. Scientists have observed that these infrasonic waves can be reflected and transmitted through Earth. Large earthquakes can send **shock waves** to the other side of the globe. Other applications of infra-acoustic studies include animal communication. Animal behavior scientists were long mystified by the sudden reactions of an entire elephant herd to an unobserved event. Recently, it has been shown that elephants communicate with infrasound. These low **frequency**, long **wavelength** sounds are capable of traveling great distances, thus a herd might be warned of danger long before it reaches them.

Ultrasound has many applications, the most prominent of these being medical. It is used as both a diagnostic tool and as a non-surgical method of treatment. As a diagnostic tool, it is used to image internal organs. It is also used to image a fetus while it develops in the mother's womb. The signals are bounced off the tissue and are picked up by a receiver, then translated into an image on a screen. This way, doctors can see inside the body without having to do surgery. As a treatment, ultrasound can be used to disintegrate kidney, gall, and bladder stones so they can be passed by the patient in a normal manner. The ultrasound is set to a resonant frequency for each stone. The stone's response has such a high amplitude that it breaks the stone apart. Each stone has its own resonant frequency based on its size and makeup, so a variable ultrasound source is used. This method also eliminates the need for surgery in most cases. Ultrasound can also be used as a therapeutic treatment. The healing process in lesions and broken bones has been shown to be accelerated by using ultrasound.