WHAT IS SOUND REFLECTION? pdf

1: Reflection: Echo vs. Reverberation

Reflection is responsible for many interesting phenomena. Echoes are the sound of your own voice reflecting back to your ears. The sound you hear ringing in an auditorium after the band has stopped playing is caused by reflection off the walls and other objects.

The answer is simple: Absorptive sound reflective materials eliminate sound waves that hit them. Reflective materials merely bounce them in a different directions. The Science Behind the Tech Download the report: This means little or no noise is reflected back towards the source or elsewhere. Hard surfaces such as masonry or concrete are considered to be reflective. This means most of the noise is reflected back towards the noise source and beyond. A noise barrier without any added absorptive treatment is by default reflective. In highway applications for example, a reflective noise barrier on one side of the roadway can result in some sound energy being reflected back across the roadway to receivers on the opposite side. In this situation, it is a common phenomenon for one to perceive a difference in sound after a noise barrier is installed on the opposite side of a roadway. Individuals on the opposite side of the roadway may perceive a change in the quality of the sound; the signature of the reflected sound may differ from that of the source due to a change in frequency content upon reflection. Products like concrete or brick are reflective - they simply bounce sound waves off their surface in different directions. It is also common to see parallel sound walls on roadways. The net result is less than optimal performance and increased noise levels on and adjacent to the roadway Absorptive parallel sound reducing walls reduce reflections and are able to maintain the effectiveness of the barrier. In addition, the overall noise level is reduced. So which is the better sound wall design â€" absorptive or reflective? For many outdoor noise problems, well-engineered and efficient absorptive sound walls are fast becoming the noise mitigation tool of choice. Sound barrier walls fall in one of two categories: Barriers without any added absorptive treatment or design, such as block, concrete, wood or metal, are considered reflective. This means, in the case of highway applications for example, that sound energy actually bounces from one side of the roadway to the other. Because there are often reflective barriers on both sides of the road, reflective noise reverberates between the barriers and the vehicles, pouring out into the adjacent neighborhoods. This reflective phenomenon can actually increase overall noise levels to the affected residences. Ready to find out more?

2: Acoustics Chapter One: What is Reflection

Sound Wave Reflection. As sound waves leave one medium and enter another, such as an air borne wave in a room reaching a brick wall, the wave will undergo certain characteristics.

In specular reflection the phase of the reflected waves depends on the choice of the origin of coordinates, but the relative phase between s and p TE and TM polarizations is fixed by the properties of the media and of the interface between them. Reflection is enhanced in metals by suppression of wave propagation beyond their skin depths. Reflection also occurs at the surface of transparent media, such as water or glass. Diagram of specular reflection In the diagram, a light ray PO strikes a vertical mirror at point O, and the reflected ray is OQ. In fact, reflection of light may occur whenever light travels from a medium of a given refractive index into a medium with a different refractive index. In the most general case, a certain fraction of the light is reflected from the interface, and the remainder is refracted. This is analogous to the way impedance mismatch in an electric circuit causes reflection of signals. Total internal reflection of light from a denser medium occurs if the angle of incidence is greater than the critical angle. Total internal reflection is used as a means of focusing waves that cannot effectively be reflected by common means. X-ray telescopes are constructed by creating a converging "tunnel" for the waves. As the waves interact at low angle with the surface of this tunnel they are reflected toward the focus point or toward another interaction with the tunnel surface, eventually being directed to the detector at the focus. A conventional reflector would be useless as the X-rays would simply pass through the intended reflector. When light reflects off a material denser with higher refractive index than the external medium, it undergoes a phase inversion. In contrast, a less dense, lower refractive index material will reflect light in phase. This is an important principle in the field of thin-film optics. Specular reflection forms images. Reflection from a flat surface forms a mirror image , which appears to be reversed from left to right because we compare the image we see to what we would see if we were rotated into the position of the image. Specular reflection at a curved surface forms an image which may be magnified or demagnified; curved mirrors have optical power. Such mirrors may have surfaces that are spherical or parabolic. Refraction of light at the interface between two media. Laws of reflection Main article: Specular reflection If the reflecting surface is very smooth, the reflection of light that occurs is called specular or regular reflection. The laws of reflection are as follows: The incident ray, the reflected ray and the normal to the reflection surface at the point of the incidence lie in the same plane. The angle which the incident ray makes with the normal is equal to the angle which the reflected ray makes to the same normal. The reflected ray and the incident ray are on the opposite sides of the normal. These three laws can all be derived from the Fresnel equations. Mechanism Play media 2D simulation: White blur represents the probability distribution of finding a particle in a given place if measured. Light waves incident on a material induce small oscillations of polarisation in the individual atoms or oscillation of electrons, in metals , causing each particle to radiate a small secondary wave in all directions, like a dipole antenna. All these waves add up to give specular reflection and refraction, according to the Huygensâ€"Fresnel principle. In the case of dielectrics such as glass, the electric field of the light acts on the electrons in the material, and the moving electrons generate fields and become new radiators. The refracted light in the glass is the combination of the forward radiation of the electrons and the incident light. The reflected light is the combination of the backward radiation of all of the electrons. In metals, electrons with no binding energy are called free electrons. Lightâ€"matter interaction in terms of photons is a topic of quantum electrodynamics , and is described in detail by Richard Feynman in his popular book QED: The Strange Theory of Light and Matter. Diffuse reflection Main article: Diffuse reflection When light strikes the surface of a non-metallic material it bounces off in all directions due to multiple reflections by the microscopic irregularities inside the material e. This is called diffuse reflection. The exact form of the reflection depends on the structure of the material. The light sent to our eyes by most of the objects we see is due to diffuse reflection from their surface, so that this is our primary mechanism of physical observation. Retroreflector Some surfaces exhibit retroreflection. The structure of these surfaces is such that light is returned in the direction from which it came. Since the lenses of their eyes modify reciprocally the paths of the incoming and outgoing light the effect is that the eyes act as a strong retroreflector, sometimes seen at night when walking in wildlands with a flashlight. A simple retroreflector can be made by placing three ordinary mirrors mutually perpendicular to one another a corner reflector. The image produced is the inverse of one produced by a single mirror. A surface can be made partially retroreflective by depositing a layer of tiny refractive spheres on it or by creating small pyramid like structures. In both cases internal reflection causes the light to be reflected back to where it originated. This is used to make traffic signs and automobile license plates reflect light mostly back in the direction from which it came. When light reflects off a mirror , one image appears. Two mirrors placed exactly face to face give the appearance of an infinite number of images along a straight line. The multiple images seen between two mirrors that sit at an angle to each other lie over a circle. A square of four mirrors placed face to face give the appearance of an infinite number of images arranged in a plane. The multiple images seen between four mirrors assembling a pyramid, in which each pair of mirrors sits an angle to each other, lie over a sphere. If the base of the pyramid is rectangle shaped, the images spread over a section of a torus. In practice, these situations can only be approached but not achieved because the effects of any surface imperfections in the reflectors propagate and magnify, absorption gradually extinguishes the image, and any observing equipment biological or technological will interfere. Complex conjugate reflection In this process which is also known as phase conjugation , light bounces exactly back in the direction from which it came due to a nonlinear optical process. Not only the direction of the light is reversed, but the actual wavefronts are reversed as well. A conjugate reflector can be used to remove aberrations from a beam by reflecting it and then passing the reflection through the aberrating optics a second time. Other types of reflection Neutron reflection Materials that reflect neutrons , for example beryllium , are used in nuclear reactors and nuclear weapons. Sound reflection Sound diffusion panel for high frequencies When a longitudinal sound wave strikes a flat surface, sound is reflected in a coherent manner provided that the dimension of the reflective surface is large compared to the wavelength of the sound. As a result, the overall nature of the reflection varies according to the texture and structure of the surface. For example, porous materials will absorb some energy, and rough materials where rough is relative to the wavelength tend to reflect in many directionsâ€”to scatter the energy, rather than to reflect it coherently. This leads into the field of architectural acoustics , because the nature of these reflections is critical to the auditory feel of a space. In the theory of exterior noise mitigation , reflective surface size mildly detracts from the concept of a noise barrier by reflecting some of the sound into the opposite direction. Sound reflection can affect the acoustic space. Seismic reflection Further information: Study of the deep reflections of waves generated by earthquakes has allowed seismologists to determine the layered structure of the Earth.

WHAT IS SOUND REFLECTION? pdf

3: Reflection, Refraction, and Diffraction

sound reflection - the repetition of a sound resulting from reflection of the sound waves; "she could hear echoes of her own footsteps" echo, reverberation, replication reflectivity, reflexion, reflection - the ability to reflect beams or rays.

Reflection, diffusion and absorption of sound When sound hits a solid surface, it can either be reflected, diffused or absorbed. How does sound work? Sound travels as a longitudinal wave - a wave that causes air to compress and expand in the same direction as it travels. A sound will vibrate the particles in a material, whether it is a gas, liquid or solid, losing a little bit of kinetic energy with each further movement. The most effective method of stopping sound from travelling is by putting some kind of vacuum in its path. This is why in space, no-one can hear you scream! Any given material will pass on a small amount of the wave to some extent, and the greater the distance it is passed, the less noisy the sound is on the other side of the material. The frequency of the sound wave, without getting technical, is the measure of how high or low the sound appears to the listener. Deeper sounds like bass from a stereo are low frequency, higher sounds such as speech are around the mid to high level frequency range. What are reflection, diffusion and absorption of sound? A sound wave can be controlled in one of three different ways â€” it can be reflected, diffused or absorbed. Each of these reactions will depend entirely on the nature and composition of the material it comes into contact with, and each can be used to some extent in soundproofing. Below is a brief explanation of what happens in each case. Reflection Sound is bounced off a surface. This usually occurs on flat, rigid surfaces with a lot of mass like concrete or brick walls. The sound bouncing back off the surface creates an echo. Diffusion When a sound wave hits an irregular surface like foam or carpet, the vibration breaks up and travels along many much smaller paths. This divides the energy of the wave, sending it in many different directions which depletes its energy faster. Absorption When a sound wave hit a particular surface, the kinetic energy driving it is converted into a small amount of heat energy which dissipates, leeching power from the sound wave and causing it to decaying faster. This is the kind of sound insulation provided by things like foam and rubber. How well a material absorbs sound depends on a number of different factors, including material density and how porous it is. Advertisement Which is the most effective method of soundproofing? Reflection is often used to redirect noise from outside - consider highway barriers, which reflect traffic noise into the sky. If you can always control the way sound is reflected then this type of soundproofing can be effective. Reflective barriers are a good way to block out exterior noise. Diffusion is a great way to prevent echoes, dispersing the sound wave in all directions when it hits an irregular surface. Think about how much of a difference carpet or a wall rug can make in a brick or concrete room. This method is very effective for high to medium frequencies, as the vibration strength is less than that of a low frequency sound, and therefore easier to disperse. Absorption performance varies a lot based on the frequency of sound and the absorptive capabilities of the material. Absorption works best in mid to high frequencies - lower frequency sounds can push through with more force.

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4: Reflection (physics) - Wikipedia

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Rather, a sound wave will undergo certain behaviors when it encounters the end of the medium or an obstacle. Possible behaviors include reflection off the obstacle, diffraction around the obstacle, and transmission accompanied by refraction into the obstacle or new medium. In this part of Lesson 3, we will investigate behaviors that have already been discussed in a previous unit and apply them towards the reflection, diffraction, and refraction of sound waves. Reflection and Transmission of Sound When a wave reaches the boundary between one medium another medium, a portion of the wave undergoes reflection and a portion of the wave undergoes transmission across the boundary. As discussed in the previous part of Lesson 3 , the amount of reflection is dependent upon the dissimilarity of the two media. For this reason, acoustically minded builders of auditoriums and concert halls avoid the use of hard, smooth materials in the construction of their inside halls. A hard material such as concrete is as dissimilar as can be to the air through which the sound moves; subsequently, most of the sound wave is reflected by the walls and little is absorbed. Walls and ceilings of concert halls are made softer materials such as fiberglass and acoustic tiles. These materials are more similar to air than concrete and thus have a greater ability to absorb sound. This gives the room more pleasing acoustic properties. Reflection of sound waves off of surfaces can lead to one of two phenomena - an echo or a reverberation. A reverberation often occurs in a small room with height, width, and length dimensions of approximately 17 meters or less. Why the magical 17 meters? The effect of a particular sound wave upon the brain endures for more than a tiny fraction of a second; the human brain keeps a sound in memory for up to 0. If a reflected sound wave reaches the ear within 0. The reception of multiple reflections off of walls and ceilings within 0. This is why reverberations are common in rooms with dimensions of approximately 17 meters or less. Perhaps you have observed reverberations when talking in an empty room, when honking the horn while driving through a highway tunnel or underpass, or when singing in the shower. In auditoriums and concert halls, reverberations occasionally occur and lead to the displeasing garbling of a sound. But reflection of sound waves in auditoriums and concert halls do not always lead to displeasing results, especially if the reflections are designed right. Smooth walls have a tendency to direct sound waves in a specific direction. Subsequently the use of smooth walls in an auditorium will cause spectators to receive a large amount of sound from one location along the wall; there would be only one possible path by which sound waves could travel from the speakers to the listener. The auditorium would not seem to be as lively and full of sound. Rough walls tend to diffuse sound, reflecting it in a variety of directions. This allows a spectator to perceive sounds from every part of the room, making it seem lively and full. For this reason, auditorium and concert hall designers prefer construction materials that are rough rather than smooth. Reflection of sound waves also leads to echoes. Echoes are different than reverberations. Echoes occur when a reflected sound wave reaches the ear more than 0. If the elapsed time between the arrivals of the two sound waves is more than 0. In this case, the arrival of the second sound wave will be perceived as a second sound rather than the prolonging of the first sound. There will be an echo instead of a reverberation. Reflection of sound waves off of surfaces is also affected by the shape of the surface. As mentioned of water waves in Unit 10 , flat or plane surfaces reflect sound waves in such a way that the angle at which the wave approaches the surface equals the angle at which the wave leaves the surface. This principle will be extended to the reflective behavior of light waves off of plane surfaces in great detail in Unit 13 of The Physics Classroom. Reflection of sound waves off of curved surfaces leads to a more interesting phenomenon. Curved surfaces with a parabolic shape have the habit of focusing sound waves to a point. Sound waves reflecting off of parabolic surfaces concentrate all their energy to a single point in space; at that point, the sound is amplified. Perhaps you have seen a museum exhibit that utilizes a parabolic-shaped disk to collect a large amount of sound and focus it at a focal point. If you place your ear at the focal point, you can hear even the faintest whisper of a friend standing across the room. Parabolic-shaped satellite disks use this same principle of reflection to gather large amounts of electromagnetic waves and focus it at a point where the receptor is located. Scientists have recently discovered some evidence that seems to reveal that a bull moose utilizes his antlers as a satellite disk to gather and focus sound. Finally, scientists have long believed that owls are equipped with spherical facial disks that can be maneuvered in order to gather and reflect sound towards their ears. The reflective behavior of light waves off curved surfaces will be studies in great detail in Unit 13 of The Physics Classroom Tutorial. Diffraction of Sound Waves Diffraction involves a change in direction of waves as they pass through an opening or around a barrier in their path. In that unit, we saw that water waves have the ability to travel around corners, around obstacles and through openings. The amount of diffraction the sharpness of the bending increases with increasing wavelength and decreases with decreasing wavelength. In fact, when the wavelength of the wave is smaller than the obstacle or opening, no noticeable diffraction occurs. Diffraction of sound waves is commonly observed; we notice sound diffracting around corners or through door openings, allowing us to hear others who are speaking to us from adjacent rooms. Many forest-dwelling birds take advantage of the diffractive ability of long-wavelength sound waves. Owls for instance are able to communicate across long distances due to the fact that their long-wavelength hoots are able to diffract around forest trees and carry farther than the short-wavelength tweets of songbirds. Low-pitched long wavelength sounds always carry further than high-pitched short wavelength sounds. Scientists have recently learned that elephants emit infrasonic waves of very low frequency to communicate over long distances to each other. Elephants typically migrate in large herds that may sometimes become separated from each other by distances of several miles. Researchers who have observed elephant migrations from the air and have been both impressed and puzzled by the ability of elephants at the beginning and the end of these herds to make extremely synchronized movements. The matriarch at the front of the herd might make a turn to the right, which is immediately followed by elephants at the end of the herd making the same turn to the right. Only recently have they learned that the synchronized movements are preceded by infrasonic communication. While low wavelength sound waves are unable to diffract around the dense vegetation, the high wavelength sounds produced by the elephants have sufficient diffractive ability to communicate long distances. Bats use high frequency low wavelength ultrasonic waves in order to enhance their ability to hunt. The typical prey of a bat is the moth - an object not much larger than a couple of centimeters. Bats use ultrasonic echolocation methods to detect the presence of bats in the air. The answer lies in the physics of diffraction. As the wavelength of a wave becomes smaller than the obstacle that it encounters, the wave is no longer able to diffract around the obstacle, instead the wave reflects off the obstacle. Bats use ultrasonic waves with wavelengths smaller than the dimensions of their prey. These sound waves will encounter the prey, and instead of diffracting around the prey, will reflect off the prey and allow the bat to hunt by means of echolocation. Refraction of Sound Waves Refraction of waves involves a change in the direction of waves as they pass from one medium to another. Refraction, or bending of the path of the waves, is accompanied by a change in speed and wavelength of the waves. So if the media or its properties are changed, the speed of the wave is changed. Thus, waves passing from one medium to another will undergo refraction. Refraction of sound waves is most evident in situations in which the sound wave passes through a medium with gradually varying properties. For example, sound waves are known to refract when traveling over water. Even though the sound wave is not exactly changing media, it is traveling through a medium with varying properties; thus, the wave will encounter refraction and change its direction. Since water has a moderating effect upon the temperature of air, the air directly above the water tends to be cooler than the air far above the water. Sound waves travel slower in cooler air than they do in warmer air. For this reason, the portion of the wavefront directly above the water is slowed down, while the portion of the wavefronts far above the water speeds ahead. Subsequently, the direction of the wave changes, refracting downwards towards the water. This is depicted in the diagram at the right. Refraction of other waves such as light waves will be discussed in more detail in a later unit of The Physics Classroom Tutorial.

5: reflection - Dictionary Definition : www.enganchecubano.com

When sound waves strike a surface, they reflect off of that surface and can return to the source of the sound as an echo. To a listener, this may be identical to the original sound, just delayed and possibly distorted by its path through the air.

How to choose the right microphone. A lot of people buy expensive microphones for recording just to find out that they still sound awkward. The reason why this happens often has nothing to do with the mic, although a wrongly chosen model can be another significant factor. Basically, acoustics is a number of factors that determines the propagation of sound in one or another environment. This can mean many things but for the room or studio recording, it mainly comes down to reflection and absorption, and this is what we shall discuss in this article. Reflection Although any solid object can possibly reflect the sound, the degree of reflection as well as frequency specter of reflected waves may vary. Usually if an object is large enough, it can reflect any frequencies and if an object is small only higher frequencies will be reflected. Hence, room walls can reflect the sound pretty evenly while any other things in the interior will likely add some coloration to the sound. You may easily verify it by voicing in an empty room, then in a furnished or a cluttered room. Fixing Home Acoustics In recording, mics are much more pickier to those sound reflections than human ears. There are three basic kinds of reflection that can be easily distinguished by anyone. First is called echo. Echo is simply a repeated sound with a delay, the larger the distance, the bigger the delay. Every room has its own, unique reverberation, which can be both pleasant and unpleasant. However, in recording you always want to keep it down to minimum, especially home and in studio. Otherwise, even if you have a fantastic voice you will still sound dull and surreal. Being able to sing or play instruments is one thing, but being able to record is another and both are equally important. And guess what, an amateur singer recorded on tape professionally will sound more acceptable than a professional singer with amateur recording. Finally, there is a third type of reflection called a standing wave. In a standing wave, the sound is being reflected in the same phase that results in increase of the sonic amplitude. Keeping down the theory, this will mean added coloration for some frequencies, and may also result in resonation with different objects, producing different rattling or ringing sounds. Absorption Absorption can be described as the opposite of reflection. Generally, soft and porous materials do quite well for absorbing sound. This would include things like styrofoam, fiberglass, soft woods, cotton, etc. Every material provides different amount of absorption, which as well varies depending to the frequency. The thickness of material plays an important factor. The thicker the insulator, the better is the absorption. You will always find some insulating materials in studios that are meant to absorb unwanted sounds. The main reason of their use is to combat the room reflections. The sounds from the environment are being filtered by the solid walls of a studio rather than damping materials inside the room. A basement without windows would provide a great isolation from the outside noise, but would still need a bit if insulation in order to achieve a decent recording. Directionality Liquid Foam Insulation Supposing you already know about the polar patterns , different mics have different directionality. While a cardioid mic picks up sound directly in front of it but also from the sides, you would have to dampen both, the wall behind you and the sidewalls as well. If you record at home, it is also important to make sure no environment noises are coming anywhere from the sides, which can be a difficult task. It is also possible however to use a smaller piece of material to shield the mic itself and a singer rather than insulating the entire walls. While a cardioid mic can still work at home, you should never use an omni mic, as it would need isolation from every direction, which is hardly achievable even in studios. A better move could be the use of more directional mics, particularly hypercardioids. In fact, in any movies where they have to record sound inside an interior, they use shotgun mics that have a narrow focus. The reason behind this is that such mics only capture the sound of what is directly in front of them. If there is any noise or reflection coming from the sides, it will not be captured. This allows for an easy setup, as all you have to do is to position it away from any noises and bare walls that can reflect the sound. Keep in mind; those mics are also sensitive to the sounds coming from behind. You may want to position those materials behind yourself so that nothing else is being reflected and captured. It is also preferable to keep the rear end away from walls or if possible apply some shield behind it.

6: Reflection, diffusion and absorption of sound | BUILD

Reflection of sound waves off of surfaces can lead to one of two phenomena - an echo or a reverberation. A reverberation often occurs in a small room with height, width, and length dimensions of approximately 17 meters or less.

If we take two tubes and position them against a wall, as shown in the figure below, upon placing a speaker or any other source of sound near one end of the tube, we receive the sound at the end of the other tube. This activity proves that the surface of wall reflects the sound wave. In this section we shall learn more about the reflection of sound and its application in day-to-day life. Definition Sound is defined as oscillations or auditory sensation evoked by oscillations in particle displacement or velocity, propagated in a medium with internal force. Sound propagates as a mechanical wave, through a medium such as air or water. Reflections of sound Just like reflection of light, the reflection of sound is similar as it follows the laws of reflections, where the angle of reflection is equal to the angle of incidence and the reflected sound, the incident sound, and the normal sound belong in the same plane. Sound bounces off the surface of medium which can be a solid or a liquid. In order to make reflection of sound to occur, the surface can be of large size and can be either rough or polished. Laws of Reflection of Sound The angle of reflection is always equal to the angle of incidence. The reflected sound, the incident sound, and the normal sound belong in the same plane. Applications of reflection of sound Echo: The sound heard after reflections from a rigid surface such as a cliff or a wall is called echo creating a persistence of sound even after the source of sound has stopped vibrating. Echo is used by bats and dolphins to detect obstacles or to navigate. SONAR is used for the detection and location of unseen underwater objects, such as submerged submarine, sunken ships and ice-bergs. In SONAR, ultrasonic waves are sent in all directions from the ship and the received signal is analysed. Hearing aid is a device used by people with difficulty in hearing. Here, the sound waves are received by the hearing aid and are reflected into a narrower area leading to the ear. Megaphones are horn-shaped tubes that prevent the spreading out of sound waves by successive reflections, thus confining them to the air in the tube. Sound boards are curved surfaces that are placed in such a way that the sound source is at the focus. The sound waves are made to reflect equally throughout the hall or an auditorium thus enhancing their quality.

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7: sound reflection - Dictionary Definition : www.enganchecubano.com

REVERBERATION The repeated reflection that results in the persistence of sound in a large hall is called reverberation. Excessive reverberation in any auditorium/hall is not desirable because the sound becomes blurred and distorted.

To verify the laws of reflections of sound. The Theory What is reflection? Reflection is the change in direction of a wavefront at an interface between two different media so that the wavefront returns into the medium from which it originated. Common examples include the reflection of light, sound and water waves. Do you know how sound propagates? Sound propagates through air as a longitudinal wave. The speed of sound is determined by the properties of the air, and not by the frequency or amplitude of the sound. If a sound is not absorbed or transmitted when it strikes a surface, it is reflected. The law for reflection is the same as that of light, ie. How do we describe the reflection of sound? The waves are called the incident and reflected sound waves. What are incident and reflected sound waves? The sound waves that travel towards the reflecting surface are called the incident sound waves. The sound waves bouncing back from the reflecting surface are called reflected sound waves. For all practical purposes, the point of incidence and the point of reflection are the same point on the reflecting surface. A perpendicular drawn on the point of incidence is called the normal. The angle which the incident sound waves makes with the normal is called the angle of incidence, "i". The angle which the reflected sound waves makes with the normal is called the angle of reflection, "r". The incident wave, the normal to the reflecting surface and the reflected wave at the point of incidence lie in the same plane. First Law of Reflection: The incident wave, the reflected wave, and the normal at the point of incidence lie on the same plane. The angle of incidence is equal to the angle of reflection.

8: Microphone sound absorption and reflection. | Microphone Geeks

The reflection of sound is sound itself. Sound in fluid medium is basically a pressure wave with a particular frequency and amplitude. When it hits a surface, the reflected wave will have certain amount of energy absorbed, a portion of energy of loss and the rest is reflected back.

Reverberation Sound is a mechanical wave which travels through a medium from one location to another. This motion through a medium occurs as one particle of the medium interacts with its neighboring particle, transmitting the mechanical motion and corresponding energy to it. This transport of mechanical energy through a medium by particle interaction is what makes a sound wave a mechanical wave. As a sound wave reaches the end of its medium, it undergoes certain characteristic behaviors. Reflection of sound waves off of barriers result in some observable behaviors which you have likely experienced. If you have ever been inside of a large canyon, you have likely observed an echo resulting from the reflection of sound waves off the canyon walls. Suppose you are in a canyon and you give a holler. Shortly after the holler, you would hear the echo of the holler - a faint sound resembling the original sound. This echo results from the reflection of sound off the distant canyon walls and its ultimate return to your ear. If the canyon wall is more than approximately 17 meters away from where you are standing, then the sound wave will take more than 0. Since the perception of a sound usually endures in memory for only 0. Thus, we call the perception of the reflected sound wave an echo. A reverberation is quite different than an echo. The distinction between an echo and a reverberation is depicted in the animation below. A reverberation is perceived when the reflected sound wave reaches your ear in less than 0. Since the original sound wave is still held in memory, there is no time delay between the perception of the reflected sound wave and the original sound wave. The two sound waves tend to combine as one very prolonged sound wave. If you have ever sung in the shower and we know that you have , then you have probably experienced a reverberation. The Pavarotti-like sound which you hear is the result of the reflection of the sounds you create combining with the original sounds. Because the shower walls are typically less than 17 meters away, these reflected sound waves combine with your original sound waves to create a prolonged sound - a reverberation. For more information on physical descriptions of waves, visit The Physics Classroom Tutorial. Detailed information is available there on the following topics:

9: What is SOUND REFLECTION? definition of SOUND REFLECTION (Science Dictionary)

Reflection is the change in direction of a wavefront at an interface between two different media so that the wavefront returns into the medium from which it originated. Common examples include the reflection of light, sound and water waves.

Ultrasound Laws of Reflection The laws of reflection are the same for all types of waves, including light and sound. The diagram below shows light reflecting in a mirror: Angles of incidence and reflection are normally no pun intended! This all works OK for flat surfaces - normal mirrors around the house, or flat walls reflecting sound waves in an acoustic application. Curved Reflectors If a curved surface is used to reflect waves, they can be focused onto a point. The diagrams below show both a spherical and parabolic mirror shape: Parabolic mirrors are especially useful, and they have one focus point. Curved satellite dishes are used to transmit or receive radio waves. Even sound can be focused with a curved surface - for instance whispering galleries. The above photo shows a music recital room. There is a big concave surface forming one of the walls, which without treatment, would have caused sound to be focussed to a particular place in the room leading to the sound being uneven across the room. To deal with this, a surface diffuser has been added, if you look carefully you can see that the surface is wiggly. This breaks up the focussing and removes the distortion that the curved surface would have caused by reflecting the sounds into lots of different directions. The diffuser used to treat the recital room is shown below: Echoes When you shout near a tall building or under a bridge, the sound is reflected back from the walls. You hear this reflected sound as an echo. The time it takes for the echo to reach you can be used to calculate your distance from the wall. If the sound takes one second to go to the wall and back again how far away is the wall? If a trumpet plays on the stage, the sound can reflect off the back wall and return to the front of the seating stalls still quite loud. Sometimes this sound can be heard by the audience as an echo. To overcome this problem, absorbs can be put on the rear wall to stop the sound reflecting, as was done in the Royal Festival Hall, London shown below. Nowadays, it is more normal to use diffusers to disperse the reflection causing the echo. Echoes are used in Sonar and Radar. Both systems send out waves sound waves in water and electromagnetic waves in air, respectively and record the time it takes for the reflections to arrive back. From this they can detect nearby reflective objects. You also get sound radar, called SODAR which is used to detect wind speed and temperature in the atmosphere. Ultrasound is very high-frequency acoustic energy, typically between 1 and 3MHz - much higher than the frequency range audible to humans kHz. This high frequency means that the patient is not disturbed by the noise, and high amplitudes can be used, but primarily ultrasound is chosen because high frequency sounds have small wavelength. This small wavelength allows a very high degree of image detail to be recorded. The speed of sound in air is much less than that in water and the human body is mostly water! This means that there is an acoustic impedance difference between the air and the body. This difference would normally mean that a large part of the ultrasound energy is reflected away from the body and wasted. To prevent this, the transducer that produces the ultrasonic waves is placed on the skin using a special gel. The speed of sound in the gel is part way between that in air and water, and it therefore creates a smooth transition for the sound waves resulting in less reflected wasted energy. This is an example of impedance matching.

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