In heat exchange processes, heat conduction and heat radiation.

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Annotation: In this article, heat transfer is a spontaneous, irreversible process involving the transfer of heat from a hotter body to a colder body, as well as the disordered movement of microparticles, which also causes energy to be transferred from one body to another without doing microscopic work. covered about.

Key words: Heat conduction, convection, heat radiation, heat exchange, heat transfer, radiation, radiation.

Issiqlik almashinuvi jarayonlarida, issiqlik o'tkazuvchanligi va issiqlik nurlanishi.

Annotatsiya: Ushbu maqolada issiqlik almashinuvi issiqlikning issiqroq jismdan sovuqroq jismga o'tishi, shuningdek, mikrozarrachalarning tartibsiz harakati bilan bog'liq bo'lgan o'z-o'zidan, qaytarilmas jarayon bo'lib, u ham energiyaning bir tanadan ikkinchisiga o'tishiga olib keladi. mikroskopik ishlarni bajarish. haqida qamrab olgan.

Kalit so'zlar: Issiqlik o'tkazuvchanligi, konvektsiya, issiqlik nurlanishi, issiqlik almashinuvi, issiqlik uzatish, nurlanish, nurlanish.

В процессах теплообмена выделяют теплопроводность и теплоизлучение.

Аннотация: В данной статье теплообмен – самопроизвольный, необратимый процесс, заключающийся в передаче теплоты от более горячего тела к более холодному, а также неупорядоченном движении микрочастиц, что также приводит к передаче энергии от одного тела к другому без выполнять микроскопические работы. покрыто о.

Ключевые слова: Теплопроводность, конвекция, тепловое излучение, теплообмен, теплообмен, излучение, радиация.

Heat exchange occurs by means of thermal conduction, convection and radiation. In this case, the heating surface is called a heat transfer surface. In heat exchange, liquids or gases are steam working medium. In this case, the theory of heat exchange is a part of the theory of energy transfer and, together with technical thermodynamics, forms the theoretical basis of thermal engineering. Basically, the phenomenon of heat exchange occurs in steam boilers, steam and gas turbines, furnaces. We know that the phenomenon of continuous heat exchange occurs in nature. That is, we can study the theoretical and practical issues of heat exchange in thermal engineering.

Basically, heat is distributed in 3 ways:

1) Thermal conductivity
2) Convection
3) Heat radiation

Heat can be transferred mainly by convection, radiation and heat conduction. When we look at the second law of thermodynamics, it says that heat is always transferred from a body with a higher temperature to a body with a lower temperature. However, the law does not say anything about heat transfer mechanisms. However, knowing the essence of heat transfer processes and using them, being able to extract them are extremely important issues from the point of view of engineering physics. For this reason, studying the details of heat exchange processes has been one of the most urgent problems facing scientists and engineers in the fields of applied science. As mentioned above, scientists have now distinguished three types of heat exchange processes, and each of them has its own unique physical processes.

Thermal conductivity. If we put a spoon into the boiling soup in front of us, soon we will not be able to hold the spoon. The reason is that the metal from which the spoon is made has a high thermal conductivity. Therefore, the part of the metal spoon immersed in the soup transfers the heat of the soup throughout the metal, and as a result, the spoon also gets hot. In general, almost all metals exhibit high thermal conductivity, and heat transferred to a metal spreads very quickly throughout the metal. In fact, any body in nature has its own thermal conductivity index, that is, the thermal conductivity of different bodies is observed. The high thermal conductivity of metals is related to the atomic nature of metals. In metals, the atoms are arranged in a three-dimensional crystal lattice that regularly oscillates about its average statistical state. In a metal placed in a high-temperature environment, due to the high temperature in the environment and the intensity of the particles hitting it from the environment with great speed, the vibration of the metal atoms accelerates and begins to vibrate more rapidly. The temperature of the part of the metal entering the fire, or the part immersed in the boiling liquid, very quickly equals the temperature of the same flame or boiling liquid. In short, the temperature of the metal quickly equalizes with the ambient temperature. That is why the metal that touches the fire turns red when it heats up. In a high-temperature environment, thermally excited metal atoms begin to collide with neighboring atoms and transfer the energy of thermal motion to neighboring atoms. In this way, neighboring atoms also heat up quickly and warm up to ambient temperature. As soon as it gives its energy to the neighboring atom, the atoms closest to the flame quickly compensate this energy due to the thermal energy coming from the flame and again transfer energy to their neighbor. In this way, heat is rapidly spread through the metal through the interatomic chain and spreads throughout the metal. Thus, thermal conductivity is the basis for the processes of heat transfer and heat exchange through the interaction of atoms or molecules that make up a heat-conducting substance. That is, the movement of heat spreads throughout the body, but the atoms and molecules that transfer heat to each other in this process do not move. They, firmly fixed in place, transfer heat from one neighbor to another, and in this way, participate in the process of heat exchange. A compact equation describing the heat transfer process looks like this:

$$Q=A\cdot\Delta T/R$$

where Q - is the amount of transferred thermal energy; A - the cross-sectional surface of the heat-conducting body; ΔT - temperature difference between two points; And R - is the thermal resistance of the material, which represents how this material resists heat transferIn the example we gave above, ΔT - is equal to the difference between the temperature of the part of the spoon immersed in the soup and the part of it outside at room temperature, that is, the temperature of the handle. *A* - cross-sectional surface of the spoon; And R is specific for each metal and is determined from special reference tables. Looking at the formula, it is easy to see that the larger the temperature difference and the cross-sectional surface of the metal, the more heat is transferred through this metal. At the same time, if the temperature difference and the cross-sectional surface of the metal are known, then the heat transfer index through such a metal is inversely proportional to the heat resistance of this metal. That is, the higher the heat resistance of the metal, the worse its thermal conductivity. In contrast to the previous two types of heat transfer, in radiation heat transfer, the substance itself, whether it is a solid, liquid or gas, does not interfere with the heat transfer. In this case, the main reason for heat exchange is that according to the Stefan-Botsman law, in nature, any body whose temperature is higher than absolute zero emits energy from itself to the environment. The type of radiation depends on the body's temperature. This can be observed through simple examples in everyday life. For example, the metal that a blacksmith is working with is red at first, and as the temperature increases, it turns yellow, golden, and finally turns almost white. This indicates that the temperature of the body is increasing. Because the higher the temperature of the body, the shorter the wavelength of the radiation it emits. Relatively cold bodies emit radiation in the infrared range, and we cannot see these rays, but we can feel their heat, temperature. We cannot see the color of even the hottest bodies. Because they emit radiation in the invisible microwave range.

In conclusion, perhaps one of the most famous cases of the discovery of invisible rays was the discovery of the Relict Microwave Background in cosmic rays. This discovery became one of the proofs of the Big Bang hypothesis. Essentially, this background is being radiated throughout the Universe in every part of it, that is, by the Universe itself, as the Universe itself continues to expand and cool down, losing its initial tremendous temperature. is freezing All this depends on heat exchange, that is, heat processes.

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