Heat-Thermal Conduction

Thermal conduction is the transfer of heat (internal energy) by microscopic collisions of particles and movement of electrons within a body. The microscopically colliding particles, that include molecules, atoms and electrons, transfer disorganized microscopic kinetic and potential energy, jointly known as internal energy. Conduction takes place in all phases of matter including solids, liquids, gases and waves. The rate at which energy is conducted as heat between two bodies is a function of the temperature difference (temperature gradient) between the two bodies and the properties of the conductive medium through which the heat is transferred. Thermal conduction was originally called diffusion. Conduction: transfer of heat via direct contact.

Heat spontaneously flows from a hotter to a colder body. For example, heat is conducted from the hotplate of an electric stove to the bottom of a saucepan in contact with it. In the absence of an external driving energy source to the contrary, within a body or between bodies, temperature differences decay over time, and thermal equilibrium is approached, temperature becoming more uniform.

In conduction, the heat flow is within and through the body itself. In contrast, in heat transfer by thermal radiation, the transfer is often between bodies, which may be separated spatially. Also possible is transfer of heat by a combination of conduction and thermal radiation. In convection, internal energy is carried between bodies by a moving material carrier. In solids, conduction is mediated by the combination of vibrations and collisions of molecules, of propagation and collisions of [phonons], and of diffusion and collisions of free electrons. In gases and liquids, conduction is due to the collisions and diffusion of molecules during their random motion. Photons in this context do not collide with one another, and so heat transport by electromagnetic radiation is conceptually distinct from heat conduction by microscopic diffusion and collisions of material particles and phonons. But the distinction is often not easily observed, unless the material is semi-transparent.

In the engineering sciences, heat transfer includes the processes of thermal radiation, convection, and sometimes mass transfer. Usually, more than one of these processes occurs in a given situation. The conventional symbol for thermal conductivity is k. Wikipedia, Thermal Conduction

See Also

Atomic Cluster Heating
CHAPTER I. Ancient Ideas of Light and Heat
Conduction
expanding heat death universe
Figure 3.11 Thermal Polarization
FORCES DERIVED FROM INTRA-ATOMIC ENERGY - MOLECULAR FORCES, ELECTRICITY, SOLAR HEAT, ETC.
Heat
HEAT - Snell
heat death
heat divides electric potential
heat engine
HEAT FROM VIBRATION
heat life
heat multiplication
heat of resistance to tension
Heat pump and refrigeration cycle
heat resistance
Isothermal Process
latent heat
Law of Heat

magnetic conduction
multiplication of heat
Radiant heat
solar heat
specific heat
thermal
thermal concentration
thermal condition
thermal force
Thermal negation
thermal propagation
thermal reduction
Thermal Runaway
thermal vibration
WHAT IS HEAT
12.29 - Origin and Nature of Heat
12.30 - Thermal Radiation and Thermal Vacuum or Cold
12.31 - Heat Generated Through Resistance to Compression
7B.19 - Light and Heat