Theory of Heat

Rajeev Kumar*

Abstract

In this paper a theory of heat has been presented.
Keyword : Theory of heat.

1 INTRODUCTION

Let's assume that there exists a kind of particle termed as 'calorion' which is responsible for heat energy, and also let 'caloric' be the fluid of calorion particles. In addition, let's assume that kinetic energy and light energy can be transformed into heat energy via the production of calorions, and vice versa. Consequently, the amount of caloric or calorions will be measured in joule.

2 DEFINITION OF CALORIC TEMPERATURE

Let's define caloric temperature T_c as the amount of caloric (i.e., heat energy) per unit volume, i.e.,

$$T_c = \frac{\delta Q}{\delta V}$$

where

δQ = infinitesimal amount of caloric

δV = infinitesimal volume

3 ZEROTH LAW OF THERMODYNAMICS

The zeroth law of thermodynamics states that two bodies each in thermal equilibrium with a third body, are in thermal equilibrium with each other. In other words, if a body A is in thermal equilibrium with a body C, and a body B is also in thermal equilibrium with the body C, then the bodies A and B are in thermal equilibrium with each other. By thermal equilibrium between two bodies, we mean the equality of caloric temperatures of the two bodies.

4 LAW OF HEAT TRANSFER

Consider a homogeneous and isotropic medium that is stationary with respect to an inertial frame of reference, then heat flux density vector **J** will be given as

$$\mathbf{J} = -D_c \nabla T_c \qquad [\nabla T_c = grad\ (T_c)]$$

where

D_c = caloric thermal diffusivity of the medium

*rajeevkumar620692@gmail.com

5 GAS LAW

From the kinetic theory of fluids, the internal translational kinetic energy of the fluid

$$KE = \frac{3}{2}P_oV + \frac{3}{2}Mgh_c$$

now assuming that the mass of the gas is negligible and consequently pressure is approximately uniform

$$\Rightarrow KE \approx \frac{3}{2}PV$$

now let the ratio of the internal translational kinetic energy to the heat energy, for a given gas, be ξ , then

$$\Rightarrow \frac{KE}{HE} = \xi$$

$$\Rightarrow KE = \xi \times HE$$

$$\Rightarrow \frac{3}{2}PV = \xi \times HE$$

now by zeroth law of thermodynamics, caloric temperature will be uniform at thermal equilibrium

$$\Rightarrow \frac{3}{2}PV = \xi \times T_cV$$

$$\Rightarrow \frac{3}{2}P = \xi \times T_c$$

now, let

$$\xi = \rho \times f(P, T_c)$$

where ρ is the uniform mass density of the gas and f (P, T_c) is a function of pressure and caloric temperature

$$\Rightarrow \frac{3}{2}P = \rho \times f(P, T_c) \times T_c$$

$$\Rightarrow P = \frac{2}{3}\rho \times f(P, T_c) \times T_c$$

$$\Rightarrow P = \rho \times g(P, T_c) \times T_c \qquad \left[g(P, T_c) = \frac{2}{3} f(P, T_c) \right]$$

6 CONCLUSION

Thus, this theory provides us with an easy method to deal with heat transfer and gas law.

References

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