FOURIER'S LAW OF HEAT FLOW →

Fourier's law of heat conduction describes how heat energy moves through a material due to a temperature difference.

Heat naturally flows from regions of higher temperature to regions of lower temperature. The rate at which heat flows depends on:

* The temperature gradient
* The material's thermal conductivity
* The area through which heat flows.

Mathematical Form →

For steady, one dimensional heat conduction

$$q = -K \frac{dT}{dx}$$

where,

q = heat flux
K = Thermal conductivity of the material
$\frac{dT}{dx}$ = Temperature gradient

The negative sign indicates heat flows in the direction of decreasing temperature.

* VECTOR FORM →

$$q = -K \nabla T$$

where:

q = Heat flux vector

∇T = Temperature gradient vector

K can be a scalar (for isotropic materials) or a tensor (for anisotropic materials)

TOTAL HEAT FLOW RATE →

If heat flows through a surface of area A the total rate of heat transfer is:

$$\dot{Q} = -KA\frac{dT}{dx}$$

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