Diffusion Equation

@wikipedia

Second order partial differential equation of parabolic type on the space-time field variable $\mathrm{w}(t, \mathbf{r})$:

(1) $$\beta \cdot \frac{\partial \mathrm{w}}{\partial t} = \nabla \left(M \nabla \mathrm{w} \right) + f(\mathbf{r})$$

where

$\mathrm{w}(t, \mathbf{r})$	dynamic variable	$M = M(\mathbf{r}, \mathrm{w})$	mobility kinetic coefficient
t	time	$\beta = \beta(\mathbf{r}, \mathrm{w})$	capacitance kinetic coefficient
$\mathbf{r} = (x, y, z) \in R^3$	position vector	$f(\mathbf{r})$	density of external forces

In the absence of external forces and constant kinetic coefficients the Diffusion Equation takes form:

(2) $$\frac{\partial \mathrm{w}}{\partial t} = D \cdot \Delta \mathrm{w}$$

where D is called diffusion coefficient:

(3) $$D = \frac{M}{\beta}$$