

Material derivative

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Time [rate of change](#) of some physical quantity $A(t, \mathbf{r})$ (like [heat](#) or [momentum](#)) of a [material element](#) that is subjected to a space-and-time-dependent [macroscopic velocity field](#) variations of that physical quantity:

(1)
$$\frac{DA}{Dt} = \frac{\partial A}{\partial t} + \mathbf{u} \nabla A$$

where

$(t, \mathbf{r})$	time and spatial variables
$\mathbf{u}(t, \mathbf{r})$	velocity of Continuum Body
$A(t, \mathbf{r})$	velocity of Continuum Body

See also

[Physics](#) / [Mechanics](#) / [Continuum mechanics](#)