

Incompressible flow

[@wikipedia](#)

The [fluid flow](#) with zero material derivative of its density:

$$(1) \quad \frac{D\rho}{Dt} = \frac{\partial\rho}{\partial t} + \rho \cdot \nabla \mathbf{u} = 0$$

which is equivalent to (with account of [Continuity equation](#)):

$$(2) \quad \nabla \mathbf{u} = 0$$

and means that velocity of [Incompressible flow](#) is [solenoidal](#).

The term [Incompressible flow](#) is a misnomer as it does not necessarily mean that the [fluid](#) itself is [incompressible](#).

In many practical applications condition (2) is met for [compressible](#) fluids (at least when [fluid compressibility](#) is relatively small) and the [fluid flow](#) satisfies (2) and is called [incompressible flow](#).

See also

[Physics](#) / [Mechanics](#) / [Continuum mechanics](#) / [Fluid Mechanics](#) / [Fluid Dynamics](#) / [Fluid flow](#)