Incompressible flow

@wikipedia

The fluid flow with zero material derivative of its density:

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

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

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

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