

Pipe Flow Mass Conservation

$$(1) \quad \dot{m}(t, l) = \dot{m} = \text{const}$$

where

$\dot{m}$	mass flowrate along the pipe
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The physical meaning of [Pipe Flow Mass Conservation](#) is that total mass passing through [cross-section area](#) of a pipe at any location of its trajectory is staying constant as there is no [mass](#) exchange of the [fluid](#) through the walls.

Equation [\(1\)](#) can be also written as:

$$(2) \quad \dot{m}(t, l) = \rho(p) \cdot q(t, l) = \text{const}$$

where

$\dot{m}$	mass flowrate along the pipe
$\rho(T, p)$	fluid density
$p(t, l)$	fluid pressure distribution along the pipe
$q(t, l)$	volumetric flowrate of the pipe flow

Alternative forms

In case of a [Pipe Flow](#) with constant [cross-section area](#) $A(l) = A = \text{const}$ it also leads to conservation of [mass flux](#):

$$(3) \quad j_m(t, l) = j_m = \frac{\dot{m}}{A} = \text{const}$$

where

j_m	mass flux along the pipe
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Equation [\(3\)](#) can be also written as:

$$(4) \quad j_m = \rho \cdot u = \text{const}$$

where

u	superficial velocity of the pipe flow
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See also

[Physics](#) / [Mechanics](#) / [Continuum mechanics](#) / [Fluid Mechanics](#) / [Fluid Dynamics](#) / [Fluid Flow](#) / [Pipe Flow](#) / [Pipe Flow Dynamics](#) / [Pipe Flow Simulation](#)

[[Mass conservation](#)]

