

$$F = \lim_{\Delta t \rightarrow 0} \frac{1}{\Delta t} \times$$

$\begin{aligned} &[(v + \Delta v) - v_0] \Delta m \\ &+ m \Delta v \end{aligned}$

$$\begin{aligned} &= (v - v_0) \frac{dm}{dt} \\ &+ m \frac{dv}{dt} \end{aligned}$$