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Question: 6.2 Newton's second law can be stated in this way: the force i...

1. **6.2** Newton's second law can be stated in this way: the force is equal to the rate of change of momentum, $F = d(mv)/dt$. Taking the derivative by parts yields $F = m(dv/dt) + v(dm/dt)$. This does not correspond to $F = ma$. What is the source of the discrepancy?

Expert Answer



Anonymous answered this
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We use a special case in the definition of force, in which mass=constant. Only with constant mass, we can use this formula, $F=ma$.

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Force = Rate of change in momentum

$$= \frac{dp}{dt} = \frac{d(m \times v)}{dt}$$
$$= v \left(\frac{dm}{dt} \right) + m \left(\frac{dv}{dt} \right)$$
$$F = v \left(\frac{dm}{dt} \right) + ma \quad \text{--- (1)}$$

The reason of this discrepancy is,
since mass = constant
(in some special cases
like rocket fuel)

So, $\frac{dm}{dt} = 0$ [For $m = \text{Constant}$]

Now Equation (1) becomes.

$$F = v \times 0 + ma \Rightarrow \boxed{F = ma}$$

We must keep in mind, this formula is only valid if mass is constant not variable.


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negligible mass, and both it and the inclined plane are frictionless. Block A has a mass of 1.0 kg, block B has a

[See answer](#)

M is sitting at equilibrium on



[See answer](#)

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Q: Which of the following statements (A-C) is not true given, $2D + E \rightarrow 3A + B + 2C$ and $\text{rate} = k[A][B]$?
 a. The reaction is 2nd order overall
 b. The reaction is zeroth order with respect to C
 c. The reaction is first order with respect to A and first order with respect to B
 d. all statements are true

A: [See answer](#) 100% (1 rating)

Q: Determine the external reactions in the x and y directions needed to hold this fixed vane, which turns the oil jet in a horizontal plane. Here $V_1 = 18 \text{ m/s}$, $V_2 = 17 \text{ m/s}$, and $\dot{V} = 0.15 \text{ m}^3/\text{s}$.

A: [See answer](#) 100% (10 ratings)

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