INTEGRATION OF MATHEMATICAL AND PHYSICAL KNOWLEDGE IN THE TEACHING OF HIGHER MATHEMATICS

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One of the important factors in improving the quality of personnel is the integration of mathematical knowledge with knowledge of physics, chemistry and other natural sciences in the teaching of higher mathematics in higher education institutions trained by engineers, pedagogical educators, technologists, economists. When a new concept or theoretical knowledge is given from higher mathematics, it is important to apply the knowledge in the sciences in order to give examples or demonstrate how to apply their application. For example, if the concept of function is introduced, if R_t time axis R_x take that as the space axis

$R^2 = R_t \times R_x$, $f: R^2 \to R^2$ reflection $\begin{cases} x' = x - vt \\ t' = t \end{cases}$ with formula

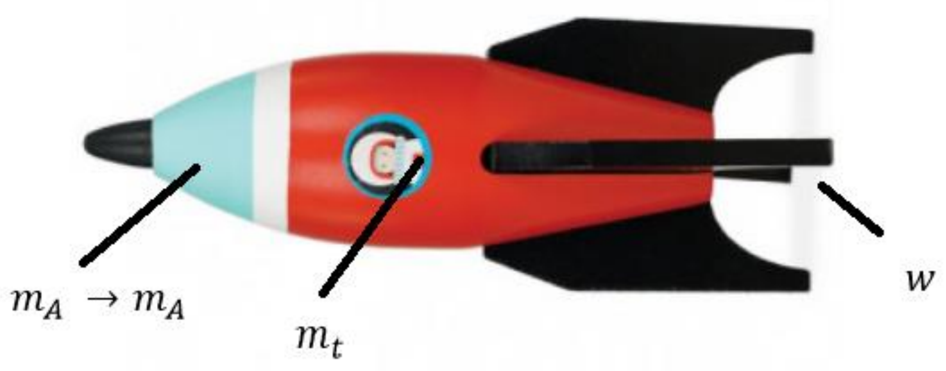
when given (x, t) other than the inertial coordinate system (x', t') representing the classical substitution of Galileo for the transition to the system

$$\mathrm{I}: \mathrm{R}^2 \to \mathrm{R}^2, \quad x' = \frac{x - vt}{\sqrt{1 - \left(\frac{v}{c}\right)^2}}, \qquad t' = \frac{t - \left(\frac{v}{c^2}\right)x}{\sqrt{1 - \left(\frac{v}{c}\right)^2}}$$

and the relation is expedient to express the one-dimensional Lorentz substitution, which plays an important role in the theory of special relativity.

The citation of Tsialkovsky's formula in the application of differential calculus can be a shining example of the integration of mathematical and physical knowledge.

Consider a rocket moving away from a gravitational mass moving in a straight line in open



space.

M(t) t- Let the mass of the fuel rocket in the moment. v(t) his t– momentum speed, W– the velocity of the fuel burning from the rocket nozzle relative to the rocket. In this case, if we consider this system as a closed system -

momentum impulse $M\ (t) \cdot\ v(t)$ is equal to. $t +\ h$ – the momentum of the rocket with the remaining fuel M $(t+h) \cdot\ v(t+h)$ and the mass that has been discarded so far

$$|\Delta M|\ =\ |M\ (t\ +h) — M\ (t)\ | = -(M(t\ +h) — \mathrm{M}(t)$$

ΔI impulse $(v(t) — w)\ |\Delta M|\ < \Delta I\ \ <\ (v(t\ +h) — w)\ |\Delta M|$ will be in the range, ie $\Delta I = (v(t) — w)|\Delta M| +\ \alpha(h)|\Delta M|\ \ v(t)$ from the continuity of $h \to 0$ yes $\alpha(h) \to 0$ arises. Of the system t and $t\ +h$ simplifying by equating the momentum pulses

$$\mathrm{M}(t\ +h)(v(t\ +h) — v(t))\ =\ -w(M(t\ +h) — \mathrm{M}(t))\ +\ \alpha(h)(M(t\ +h) — \mathrm{M}(t)$$

we will have Let's do this as h to the limit $M\ (t)\ .v'\ (t)\ =\ -wM'(t)$ we will have From this $v'(t)\ = (-wIn\ M)' \cdot\ (t)\ , v(t)\ =\ -wIn\ M(t)\ +\mathrm{c}$

Agar $v(0) = v_0$ if $c\ =\ v_0\ +\ wIn\ M\ (0)$ will be. From this $v(t) =\ v_0 + w\ln\frac{M(0)}{M(t)}$ we come to. This is the Tsialkovsky formula.

Thus, the integration of disciplines in Higher Mathematics classes deepens the concepts in the integrated discipline

to understand, plays an important role in applying them to life.

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