On a New Analysis of the Foundations of Classical Mechanics. I. Dynamics TEMUR Z. KALANOV, Home of Physical Problems, Pisatelskaya 6a, 100200 Tashkent, Uzbekistan — The approach to the critical analysis of classical mechanics, based on formal logic, is proposed. From the logic point of view, the problem is that to identify a material point M, i.e. to establish the identity relation between concepts "physical object M" and "mathematical object M". The idea of the correct solution of this problem is as follows. As it is known, the material point M is characterized by following quantities: mass m_M; position in system of coordinates at the moment of time t; velocity $\vec{v}_M(t)$; acceleration $d\vec{v}_M/dt$. If mass and velocity are essential (dynamic) properties (signs) of a material point M, then momentum $\vec{p}_M(t) \equiv m_M \vec{v}_M(t)$ represents the dynamic identifier of a material point M. In this case, expressions for kinetic energy $E_M^{(kin)}(t) \equiv p_M^2/m_M = m_M v_M^2(t)$ and for force $\vec{f}_M \equiv d\vec{p}_M/dt$ are consequences of this identifier. It means that $\vec{f}_M \equiv d\vec{p}_M/dt$ is a definition of force, and mass m_M should be determined by other identifier. Force is a vector manifestation of energy. Thus, the logic approach to the analysis of classical mechanics leads to correct definition of force.

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