On The Concept of Kinetic Energy

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Abstract
We analyze, in their historic perspective, the three alternative traditional definitions of kinetic energy and then propose a new definition according to which the change in kinetic energy is equal to the scalar product of the velocity and the change in momentum. We justify this definition on conceptual grounds, and show that it follows from Hamilton´s equations. From this definition, the explicit classical and relativistic expressions for kinetic energy follow simply upon using the appropriate mass function. The definition given here has the added advantage of being naturally generalizable to a canonical kinetic energy per degree of freedom. This latter takes into account both particle and field kinetic energies.