On the Mechanical Dynamics of Moving Bodies

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Dynamic experiments with energy calculations of moving bodies can be carried out with free and widely used electronics simulation software. All you have to do is exchange electrical and mechanical variables. This disproves the statements of an SRT doubter.

1. Introduction

A SRT-doubter claims analogously:

Two identical bodies with same masses of ***m = 1 kg*** *move towards each other at a speed of* ***v = 100 m/s*** *and collide.*

The collision energy is calculated by adding the two kinetic energies:

$$E = 0.5\ m\ v^2 + 0.5\ m\ v^2 = m\ v^2$$

$$E = 1\ kg\ (100\ m/s)^2 = 10\ kJ \qquad (1)$$

However, if we change the frame of reference and look at the world from one of the two bodies, we will see the other body hurtling towards us at a speed of ***v = 200 m/s****. The collision energy then is:*

$$E = 0.5\ m\ v^2 = 0.5\ kg\ (200\ m/s)^2$$

$$E = 20\ kJ \qquad (2)$$

This doubling of the collision energy simply by changing the reference is claimed to be a violation of Newton's laws and the entire theory of relativity is called into question [Khilji24].

The following shows how such an error can be refuted by experiment.

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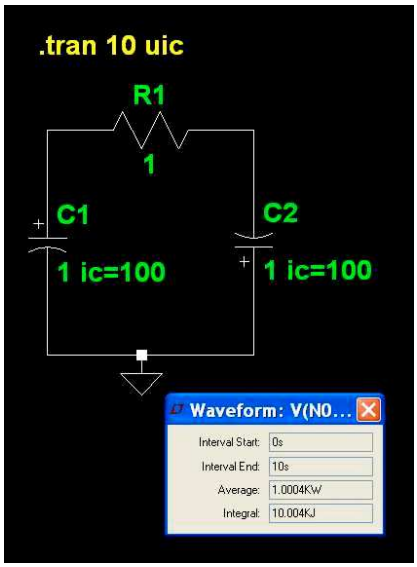
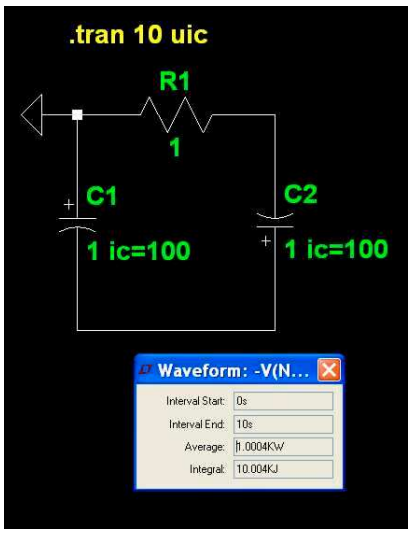
2. Experiment

The mechanical energy is calculated as **E = 0.5 m v²**. The electrical energy is calculated as **E = 0.5 C U²**. A capacitance of 1 farad charged with 100 volts therefore contains the same energy as a 1 kg body accelerated to 100 m/s. Capacitance and voltage correspond to mass and speed.

Mechanical experiments can therefore be replaced by electrical experiments, which can even be carried out virtually using simulation software. The free and very popular LTSpice is recommended [LTSpice].



Two capacitances C1 and C2 of 1 farad each (≙ 1 kg) are charged with an "initial condition (ic)" of 100 V (≙ 100 m/s] each in relation to the lower reference point (arrow symbol). The opposite pole charges simulate the different directions of the velocities. The collision energy is measured at resistor R1, whose power is integrated to 10 kJ over 10 seconds. The simulation confirms the doubter's calculation (1).



The reference point is now changed to the left-hand body. Everything else remains unchanged. Again 10 kJ are displayed. The doubter's calculation (2) that a change of reference doubles the collision energy to 20 kJ is refuted by experiment!

The correct calculation is: **E = 0.5 (0.5 C) (U)² = 0.25 kg (200 V)² = 10 kJ**, because the capacitance is halved in the series circuit charged to 200 V. Similarly, the effective mass is halved in a one-sided collision.

[Khilji24] M. J. Khilji, Complex Relativity: Insights Reflecting Newton's First Law, https://vixra.org/abs/2406.0189
[LTSpice] https://www.analog.com/en/resources/design-tools-and-calculators/ltspice-simulator.html