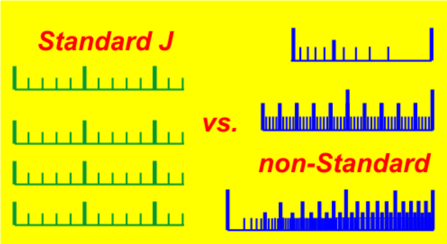
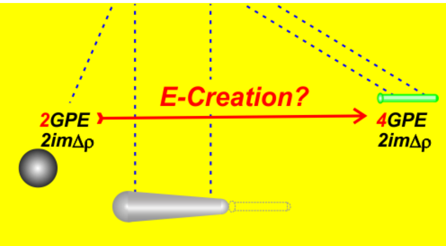
Six Duality Laws of Momentum and Energy

Guide for improving standards.

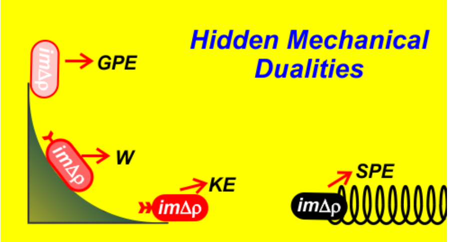
Article 3: Third Duality Law of non-Standard Energy Sizes and Varying Productivity



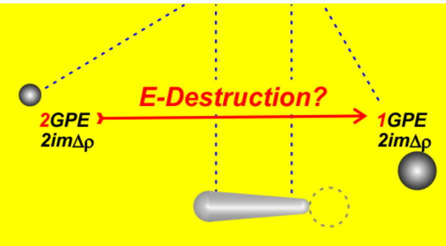
Article 4: Fourth Duality Law of Situational Energy Creation



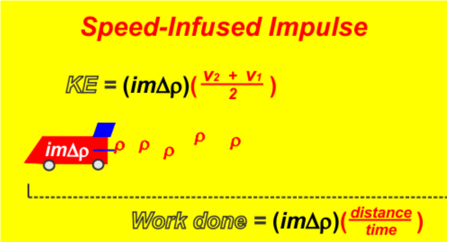
Article 1: First Duality Law of Momentum-Energy Coexistence



Article 5: Fifth Duality Law of Situational Energy Destruction



Article 2: Second Duality Law of Perceived Speedy-Impulse



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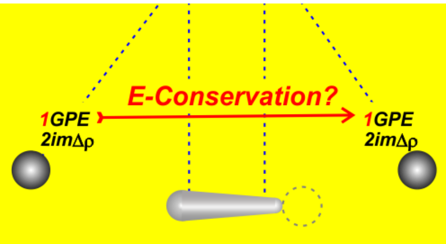

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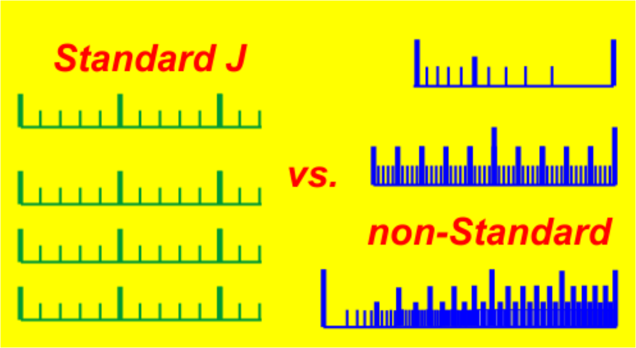


3. Third Duality Law of non-Standard Energy Sizes and Varying Productivity

Du-Ane Du

www.Wacky1301SCI.com, *"Looking at serious science, sideways!"*

Mathematical Duality Law #3: As the result of Joule's original definitions and experiments, the international treaty for units and measurements contains an unclarified assumption that energy and work are always measured at a fixed speed of 1 ft/s [English] and a fixed productivity of 0.84 J/ρ. Inconsistent adherence to that unclarified assumption has resulted in measurements that may be (1) standard linearized, with an impulse coefficient [IC] = 1.185, or (2) multiple-linear, resulting in a wide variety of non-standard joule sizes, or (3) multi-parabolic, resulting in an infinite variety of continually changing non-standard joule sizes. (Addition or subtraction of non-standard joule sizes can produce answers that violate the law of conservation for momentum.)

This third advanced article on the six duality laws of momentum and energy will focus on the standardization problems associated with the non-standardized joules that occur when measurements involve accelerations and non-standard velocities. (Other articles and simpler discussions of these topics can be found at www.Wacky1301SCI.com.)

Energy comes in several forms. Standard linearized joules are mathematically parallel to impulse. Examples of linearized joules include calorie-joules, light-joules, electric-joules, and some forms of chemical energy.

Work done at a constant speed produces energy units that vary in size from experiment to experiment, while work and energy measured during different accelerations produces energy units that vary in size during experiments.

“I noticed this earlier,” Devil’s Advocate says, “in Article 2, during the acceleration of a falling object, the joule production rate was slow at first (with a large impulse coefficient) but much faster a couple of seconds later!”

Precisely, KE, GPE, SPE, and WE involve an infinite number of acceleration situations, producing an infinite number of joule sizes—an energy system that is mathematically multi-parabolic in nature. The complexity of the multi-parabolic environment is easily sorted out through the use of an [IC] impulse-coefficient base-of-comparison on all joules measurements.

$$[IC] = \left[\frac{impulse}{energy}\right] = \left[\frac{\rho}{J}\right] = \left[\frac{s}{m}\right] = \left[\frac{1}{speed}\right] = \left[\frac{1}{productivity}\right]$$

$$\frac{1}{[IC]} = \frac{1}{[\rho/J]} = \frac{1}{[s/m]} = [speed] = [\frac{J}{\rho}] = [productivity]$$

Example: *30 J*$_{[0.05]}$ *means the average joule size is* [*0.05*]*, the average joule involves 0.05 ρ of impulse, with a speedy multiplier of* $\frac{1}{[0.05]}$ *= 20 m/s, and a productivity of* $\frac{1}{[0.05\ \rho/J]}$ *= 20 J/ρ.*

"This should be fun," Devil's Advocate says, "I'm going to approach this article as if we are exploring a candy store—sweets, taffies, fudges—open imaginations can produce sweets for the mind… so relax, prepare for the exciting possibility of new ideas, and enjoy perspectives you've never considered—visions with new understandings."

Standard linearized joules

Symbols
*im*Δρ = impulse
10 ρ = 10 kgm/s
10 ρ = 10 N*s

Standard linearized joules were codified in the mid 1800's by James Prescott Joule. Joule began by theorizing that electrical energy and heat caloric were the same thing. There was no world-wide standard for measuring electricity, so Joule proposed that the common copper-zinc battery (called a Daniell cell) be used to standardize both electricity and heat-caloric.

Joule further proposed that the electric pressure produced by a copper-zinc battery be called 1 volt of electricity. (Hereafter this shall be identified as 1 $V_{Cu\text{-}Zn}$, to denote the fact that it is based on the traditional definition involving a copper-zinc battery.)

One ampere of electric current was defined as 1 coulomb per second. One joule of electricity was then defined as:

$$1\ J_{Cu\text{-}Zn} = (1\ V_{Cu\text{-}Zn})(1\ A)(1\ second)$$

James Prescott Joule came to believe that several joules of electric energy were equivalent to the English unit for heat caloric, which was equivalent to 778 foot-pounds, at 1 ft/sec.

Joule designed his most famous Heat-is-Work experiment to be performed at a constant speed of 1 ft/sec. It involved heating water in a churn, by turning the churn crank with a force of 1 lb, a speed of 1 ft/s, for 900 seconds.

“Notice the speed and the time,” Devil’s Advocate says. “Multiplying the 1 lb of force by 900 s gives an impulse value of 900 foot-seconds.”

Correct, in fact, Joule’s most accurate published experiment involved measuring impulse first, then converting the impulse data into foot-pounds.

Joule’s experiment correlated 900 foot-seconds and 778 foot-pounds of work done, which is equivalent to

778 foot-pounds of electrical energy, as defined by the Daniell cell.

Dividing Joule's impulse value by his energy value, Joule's impulse coefficient for electric energy was:

$$[IC] = \frac{im\Delta\rho}{energy} = \frac{900}{778} = 1.16\ \frac{ft\text{-}s}{ft\text{-}lb}$$

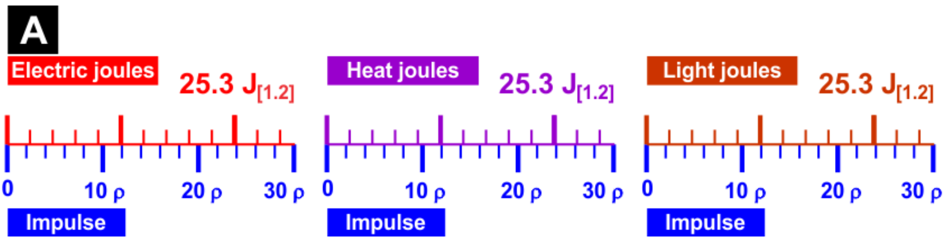
Joule performed many experiments, and this was the only published experiment as low as 900 foot-seconds. Most showed values much higher. Joule's data suggests that calorie-joules and electric joules both have a standard impulse coefficient [IC] of between 1.16 ρ/J and 1.2 ρ/J.

"Joule's hand-crank experiment was duplicated in *Murdered Energy Mysteries*, Chapter 304," Devil's Advocate says. "There the author compared the mechanical impulse needed to heat a bowl of water to the electrical energy needed to heat the same water. That experiment suggested calorie-joules and electric joules both have a standard impulse coefficient [IC] of 1.185 ρ/J."

Not only that, in *Murdered Energy Mysteries*, Chapter 411, voltage is calibrated by comparing the voltage and amperage of a solenoid, to the force the solenoid produces on a permanent magnet. That experiment shows that 1 electric joule is equivalent to 1.185 ρ of impulse, which is an impulse coefficient [IC] of 1.185 ρ/J.

"That's a wide variety of support positions," Devil's Advocate says. "All involve non-accelerations, so the units will be linear—linearized joules!"

Good point. The three most linearized forms of energy are calorie-joules, electric-joules, and light-joules. Their relationship to heat-impulse, electric-impulse, and light-impulse can be represented by comparative number lines:



(Because all of these joules are exactly the same size, the impulse coefficient can be presented in the simplified form [1.2].)

In the case of electric joules, the measurement of 25.3 $J_{[1.2]}$ indicates the joule ticks are size [1.185]. The average electric joule involves 1.185 ρ of impulse, a speedy multiplier of $\frac{1}{[1.185]}$ = 0.84 m/s, and a joule production rate of $\frac{1}{[1.185\ \rho/J]}$ = 0.84 J/ρ.*

In graph A2, a calorie-joules measurement of 25.3 $J_{[1.2]}$ also has a joule tick-size of [1.185]. The average calorie-joule involves 1.185 ρ of impulse, and a productivity multiplier of $\frac{1}{[1.185\ \rho/J]}$ = 0.84 J/ρ.

Likewise, in graph A3, the average light-joule involves 1.185 ρ of impulse and joule production rate of 0.84 J/ρ. The ticks are size [1.185], and all of this is identified by writing a measurement in the form 25.3 $J_{[1.2]}$.

"Impressive," Devil's Advocate says, "These forms of energy have the same percentage of impulse in every joule, the productivity is the same, and the tick-size is always the same. As a result, these forms of energy are fully linearized, and the mathematics is an exact parallel of impulse and momentum mathematics."

Now recall that in Article 2, "Second Duality Law of Perceived Speedy-Impulse", it was found that energy is a (profit oriented, psychological) joint perception of average speed and impulse used, speed infused effort, or speedy impulse.

In the case of linearized electric-joules, calorie-joules, and light-joules, the impulse coefficient is always [1.185 ρ/J]. Therefore, *linearized energy is primarily a psychological perception of impulse in action*.

This suggests, electrical impulse and electrical energy are two different measurements of the same physical phenomenon. Likewise, light impulse and light energy may also be two different measurements of the same physical phenomenon.

In all situations, the equations for standard linearized joules are:

$$Standard\ J = \frac{mv}{[1.185\ \rho/J]}$$

$$Standard\ J = \frac{impulse}{[1.185\ \rho/J]}$$

[*Note, the joule production rate of 0.84 J/ρ is lower than the 1.00 J/ρ which would be typical of a measurement made at 1 m/s. This is caused by (1) Joule's use of the English standard speed of 1 ft/s, (2) the definition of electric voltage as that of a Cu-Zn battery, and (3) several unit re-definitions that have occurred over the years.]

Addition and subtraction of standard linearized joules will never violate the law of conservation for momentum.

"Can we verify this?" Devil's Advocate says.

Good question. Part of the purpose of the impulse coefficient is to help scientists track the relationship between joules data and the law of conservation of momentum.

For example, the values 100 $J_{[1.2]}$ and 400 $J_{[1.2]}$ have identical bases, therefore they can be added or subtracted, as follows:

$$100\ J_{[1.185]} + 400\ J_{[1.185]}\ =\ 500\ J_{[1.185]}$$

To show this is valid, we check the law of conservation for momentum. First, the joules data is multiplied by the impulse coefficient, and the addition double checked, as follows:

$$100\ J[1.185\ \rho/J] + 400J[1.185\ \rho/J]\ ???\ 500J[1.185\ \rho/J]$$

$$118.5\ \rho\ +\ 474\ \rho\ =\ 592.5\ \rho\ \textbf{\textit{TRUE}}$$

"Both sides are the same, so momentum is not created or destroyed," Devil's Advocate says. "Therefore, the addition of standard linearized joules does not violate the law of conservation for momentum."

Subtraction also does not cause problems when the impulse coefficients are identical.

Multi-linear joules

Work-done occurs when an experiment begins and ends at the same speed, usually 0 m/s. Work-energy occurs when an experiment begins and ends at different speeds.

"Work-done involves average speeds," Devil's Advocate says, "while work-energy involves accelerations. Let's begin by focusing on work-done at a constant speed."

Good suggestion. Recall that when James Prescott Joule standardized calorie-joules and electric-joules, his experimental procedure created a standard impulse coefficient of [1.185] and a standard speed of 0.84 m/s.

When work-done experiments are performed at non-standard speeds, then the joule tick-size changes. (Faster speeds produce smaller tick sizes, etc.)

If the same experiment is performed at several different speeds, then the joule tick-size will be the same within each experiment, but the tick size will be different from experiment to experiment.

“That means the joules data will be multiple-linear,” Devil’s Advocate says, “multi-linear because it involves a wide variety of non-standard joule sizes. Example?”

As an illustration, consider an experiment involving three objects with different masses. Each object will experience a constant drag force of 1 N. They will experience a forward accelerating force of 2 N for 2 s, then they will experience a speed-maintenance force of 1 N for 26 s. The forward force will drop to 0 N for 2 s, during which time the drag force will cause them to slow to a stop.

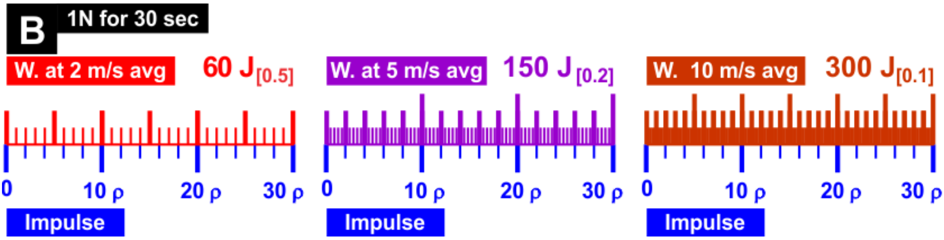
The complete experiment will take 30 s, the objects will experience an average forward force of 1 N, and a net forward impulse of 30 ρ, or 30 Ns.

The heaviest object (below 1 kg) will accelerate slowly, so we can imagine it coasting to a stop 60 m from its origin, after 30 s, for an average speed of 2 m/s.

The second object (below 0.4 kg) will accelerate faster, so we can imagine it traveling a distance of 150 m in 30 s, for an average speed of 5 m/s.

The lightest object (below 0.2 kg) will have the highest acceleration and the fastest speed. So, we can imagine it coasting to a stop 300 m from its origin, after 30 s, for an average speed of 10 m/s.

Recall that energy is speedy impulse, or (average speed)(impulse). Based on those computations, the comparative graphs for the joules of work done by the 30 ρ of impulse are:



In the first, 2 m/s experiment, the joule production rate and average joule size are:

$$joule\ production\ rate = \frac{energy}{im\Delta\rho} = \frac{60\ J}{30\ \rho} = \mathbf{2\,\frac{J}{\rho}}$$

$$joule\ size = \frac{im\Delta\rho}{energy} = \frac{30\ \rho}{60\ J} = \mathbf{[0.5]} = impulse\ coefficient$$

[0.5] *also indicates that 1 joule contains 0.5 ρ of impulse.*

Note that the joule production rate is the same as the average speed. When the units are simplified:

$$2\,\frac{J}{\rho} = 2\,\frac{kg\frac{m}{s}\frac{m}{s}}{kg\frac{m}{s}} = 2\,\frac{m}{s}$$

"In essence," Devil's Advocate says, "the speedy multiplier and the productivity multiplier are two sides of the same coin."

Nice analogy. The productivity multiplier is also the inverse of the joule size and the impulse coefficient. Recall:

$$[IC] = \left[\frac{impulse}{energy}\right] = \left[\frac{\rho}{J}\right] = \left[\frac{s}{m}\right] = \left[\frac{1}{speed}\right] = \left[\frac{1}{productivity}\right]$$

$$\frac{1}{[IC]} = \frac{1}{[\rho/J]} = \frac{1}{[s/m]} = [speed] = [\frac{J}{\rho}] = [productivity]$$

Next, in the second, 5 m/s experiment, the joule production rate and average joule size are:

$$joule\ production\ rate = \frac{energy}{im\Delta\rho} = \frac{150\ J}{30\ \rho} = \mathbf{5\frac{J}{\rho}} = 5\frac{m}{s}$$

$$joule\ size = \frac{im\Delta\rho}{energy} = \frac{30\rho}{150J} = \mathbf{[0.2]} = impulse\ coefficient$$

[0.2] *also indicates that 1 joule contains 0.2 ρ of impulse.*

Finally, in the third, 10 m/s experiment:

$$joule\ production\ rate = \frac{energy}{im\Delta\rho} = \frac{300\ J}{30\ \rho} = \mathbf{10\frac{J}{\rho}} = 10\frac{m}{s}$$

$$joule\ size = \frac{im\Delta\rho}{energy} = \frac{30\rho}{300J} = \mathbf{[0.1]} = impulse\ coefficient$$

[0.1] *also indicates that 1 joule contains 0.1 ρ of impulse.*

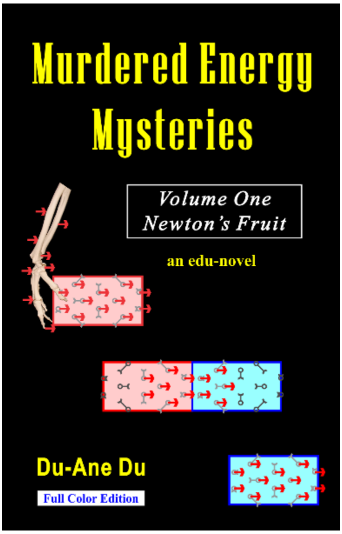
Recall that, as the result of Joule's original definitions and experiments, the international legal definition of a joule of work done includes an unclarified assumption that all experiments will be performed at a standard constant speed of 0.84 m/s (about 1 m/s).

"Interesting," Devil's Advocate says. "But this sample experiment was not done at the standardized speed, therefore the joule sizes are non-standard—which is obvious because the tick sizes are all different. The joule production rate is different for each experiment, and the impulse coefficient is different."

Note that within each experiment, the joule tick-size is fixed, and it is inversely related to the speed. Faster speeds cause higher joule production rates, which causes smaller tick sizes and lower impulse coefficients.

"The joule tick-size varies from experiment to experiment," Devil's Advocate says, "but the tick size is constant within the experiments. Taken as a whole, this multi-linear system results in a wide variety of non-standard joule sizes.

Overall then, measurements of work done at a constant non-standardized speed involves a wide variety of joule sizes. To properly understand the nature of this non-standard experimental data, the joules unit needs to include the impulse coefficient [IC] as a base of comparison.



This way, the measurement 150 $J_{[0.20]}$ clearly indicates the joule ticks were size [0.20]. The average work joule involved 0.2 ρ of impulse, a speedy multiplier of $\frac{1}{[0.20]}$ = 5 m/s, and/or a productivity multiplier of $\frac{1}{[0.20\ \rho/J]}$ = 5 J/ρ.

In Article 2, “Second Duality Law of Perceived Speedy-Impulse”, it was found that energy is a (profit oriented, psychological) joint perception of average speed and impulse used, speed infused effort, or speedy impulse.

“In the case of work done at non-standard speeds,” Devil’s Advocate says, *“energy can be thought of as a perceived speed-variant of impulse in action.”*

Addition and subtraction of multiple-linear joules does not violate the law of conservation for momentum—as long as the impulse coefficient is unchanged. But violations *do* occur when differing impulse coefficients are not properly adjusted.

For example, the values 100 $J_{[0.5]}$ and 400 $J_{[1.5]}$ have different bases, therefore simple addition can quickly violate the law of conservation for momentum, such as:

$$100\,J_{[0.5]} + 400\,J_{[1.5]} \;=\; 500\,J_{[1.5]}$$

“I’m nervous,” Devil’s Advocate says, “The joules units have different bases…seems suspicious. How do we know if the answer is mathematically valid?”

We check the law of conservation for momentum. First, the joules data is multiplied by the impulse coefficient, and the addition double checked, as follows:

$$100\,J[0.5\,\rho/J] + 400J[1.5\rho/J] \;???\; 500J[1.5\rho/J]$$

$$50\,\rho \;+\; 600\,\rho\,???\;\; 750\,\rho$$

$650\,\rho < 750\,\rho$ ***Creates momentum!***

"Horrifying," Devil's Advocate says, "improper addition of the joules data has caused a creation of momentum! That can't be valid!"

Now consider this addition:

$$100\,J_{[0.5]} + 400\,J_{[1.5]} = 500\,J_{[0.5]}$$

$$100\,J[0.5\,\rho/J] + 400J[1.5\rho/J] \;???\; 500J[0.5\rho/J]$$
$$50\,\rho + 600\,\rho \;???\; 250\,\rho$$
$$650\,\rho > 250\,\rho$$ ***Destroys momentum!***

"Equally horrifying," Devil's Advocate says. "This time, improper addition of the joules data has caused a destruction of momentum, another violation of the law of conservation for momentum! How do we add different size joules without creating or destroying momentum?"

Proper addition of the joules data requires the impulse coefficient be adjusted using a method similar to a weighted average. First the law of conservation for momentum is followed by finding the total impulse involved. Continuing with our last example, the final momentum was:

$$100\,J[0.5\,\rho/J] + 400J[1.5\rho/J] =$$
$$50\,\rho + 600\,\rho = \mathbf{650\,\rho}$$

Next, the final impulse coefficient is calculated by dividing the impulse produced by the energy produced, as follows:

$$[IC] = \frac{impulse}{energy} = \frac{650\ \rho}{100\ J + 400\ J} = [1.3]$$

$$Total\ joules = \mathbf{500\ J_{[1.3]}}$$

The obedience to the law of conservation for momentum can then be double checked, as follows:

$$100\ J_{[0.5]} + 400\ J_{[1.5]}\ ???\ 500\ J_{[1.3]}$$
$$100[0.5] + 400[1.5]\ ???\ 500[1.3]$$
$$50\ \rho\ +\ 600\ \rho\ ???\ \ 650\ \rho$$
$$650\ \rho = \ 650\ \rho$$ ***Obeys momentum laws!***

Note: 500 $J_{[1.3]}$ means the average joule size is [1.3], the average joule involves 1.3 ρ of impulse, with a speedy multiplier of $\frac{1}{[1.3]}$ = 0.77 m/s, and a joule production rate of $\frac{1}{[1.3\ \rho/J]}$, or 0.77 J/ρ.

"So," Devil's Advocate says, "If we add small non-standard joules to large non-standard joules we get a new value with a different kind of non-standard joules!"

Good point. Finally, it should be noted that non-standard joules can be converted into standard joules using the equation:

$$(\text{standard J}) = \frac{(Joules)[IC]}{1.185}$$

In the above:

$$100\ J_{[0.5]} \text{ becomes } \frac{100[0.5]}{1.185} = 42.2\ J_{[1.185]}$$
$$400\ J_{[1.5]} \text{ becomes } \frac{400[1.5]}{1.185} = 506.3\ J_{[1.185]}$$

“That’s a great solution,” Devil’s Advocate says. “These standardized joule values can be added and subtracted without violating the law of conservation for momentum! And they can be compared with each other, used in averages, etc—because the bases are the same!”

Multi-parabolic joules

Work-energy occurs when a measurement begins and ends at different speeds.

Work-energy involves accelerations which cause changes in kinetic energy, gravitational potential energy, or spring potential energy. All of these forms of energy are multiple-parabolic in nature, and they involve an infinite variety of continually changing non-standard joule sizes.

As an example, consider the effect of a 1 N force on the side of three objects with different masses (3 kg, 2 kg, 1 kg). The objects are in a frictionless environment, possibly deep in space. Each 1 N force lasts for 30 s, resulting in a net impulse of 30 ρ, or 30 Ns.

Given this impulse, the heavier object (3 kg) will develop a final momentum of 30 ρ, and a final speed of 10 m/s. The average speed and average joule production rate are:

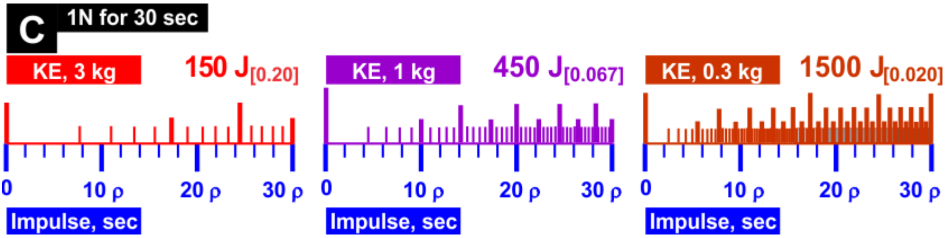
$$speedy\ multiplier = \frac{(v_2 + v_1)}{2} = \frac{(10+0)}{2} = \mathbf{5\,\frac{m}{s}}$$

$$joule\ production\ rate = 5\,\frac{m}{s} = \mathbf{5\,\frac{J}{\rho}}$$

Given the same impulse, the second object (1 kg) will develop a final momentum of 30 ρ, a final speed of 30 m/s, an average speed of 15 m/s, and average joule production rate of 15 J/ρ.

The lightest object (0.3 kg) will experience the highest acceleration, developing a final speed of 100 m/s, an average speed of 50 m/s, and average joule production rate of 50 J/ρ.

All forms of energy are speedy impulse, or (average speed)(impulse). When the impulse values are multiplied by the average speeds, the following line graphs are produced:



Note that the 3 kg object experienced the lowest acceleration, and it has the largest average joule tick-size:

$$joule\ size = \frac{im\Delta\rho}{energy} = \frac{30\rho}{150J} = \mathbf{[0.2]} = impulse\ coefficient$$

150 $J_{[0.2]}$ also indicates that the average joule contains 0.2 ρ of impulse, with a speedy multiplier of $\frac{1}{[0.2]}$ = 5 m/s, and an average joule production rate of $\frac{1}{[0.2]}$ = 5 J/ρ.

The 1 kg object an average joule tick-size of:

joule size $= \frac{im\Delta\rho}{energy} = \frac{30\rho}{450J} = [\mathbf{0.0667}]$ = *impulse coefficient*

$450\ J_{[0.0667]}$ *also indicates that the average joule contains 0.0667* ρ *of impulse, with an average speedy multiplier of* $\frac{1}{[0.0667]}$ *= 15 m/s, and an average joule production rate of* $\frac{1}{[0.0667]}$ *= 15 J/*ρ*.*

The 3 kg object experienced the highest acceleration, and it has the smallest average joule tick-size:

joule size $= \frac{im\Delta\rho}{energy} = \frac{30\ \rho}{1500\ J} = [\mathbf{0.02}]$ = *impulse coefficient*

$1500\ J_{[0.02]}$ *also indicates that the average joule contains only 0.02* ρ *of impulse, with a speedy multiplier of* $\frac{1}{[0.02]}$ = *50 m/s, and an average joule production rate of* $\frac{1}{[0.02]}$ = *50 J/*ρ*.*

"I notice," Devil's Advocate says, "that within each experiment, the joule tick-size is continually shrinking and it's inversely related to the instantaneous speed. Faster speeds cause higher joule production rates, which causes smaller tick sizes and lower impulse coefficients."

Yes, recall that in Article 2, "Second Duality Law of Perceived Speedy-Impulse", it was found that energy is a (profit oriented, psychological) joint perception of average speed and impulse used, speed infused effort, or speedy impulse.

In the case of lighter objects with high accelerations, energy can be thought of as an impulse-variant of the average speed.

The joule tick-size is parabolic during each experiment, and the parabolic acceleration is different with each experiment. Taken as a whole, this multiple-parabolic system results in an infinite variety of continually changing non-standard joule sizes.

"Overall then," Devil's Advocate says, "measurements of work energy, kinetic energy, GPE, and SPE all involve multi-parabolic joule sizes. To properly understand the nature of this non-standard experimental data, the joules unit should always include the impulse coefficient [IC] as a base of comparison."

Excellent. That way, the measurement 1500 $J_{[0.020]}$ clearly indicates the joule ticks had an average size of [0.020]. The average multi-parabolic joule involved 0.02 ρ of impulse, an average speedy multiplier of $\frac{1}{[0.020]}$ = 50 m/s, and/or an average joule production rate of $\frac{1}{[0.020\ \rho/J]}$ = 50 J/ρ.

Addition and subtraction of multiple-parabolic joules violates the law of conservation for momentum when the differing impulse coefficients are not properly adjusted.

For example, the values 400 $J_{[0.5]}$ and 100 $J_{[1.5]}$ have different bases, so simple subtraction can quickly violate the law of conservation for momentum, such as:

$$400\,J_{[0.5]} - 100\,J_{[1.5]} \;=\; 300\,J_{[1.5]}$$

To check the law of conservation for momentum, the joules data is multiplied by the impulse coefficient, and the addition double checked, as follows:

$$400\,J[0.5\,\rho/J] - 100J[1.5\rho/J]\;???\;300J[1.5\,\rho/J]$$
$$200\,\rho - \;150\,\rho\;???\;\;450\,\rho$$
$$50\,\rho\;<\;\;450\,\rho\;\textbf{\textit{Creates momentum!}}$$

“Crazy,” Devil’s Advocate says, “improper subtraction of the joules data has caused a creation of momentum!”

That’s the concern. As before, proper subtraction of the joules data requires the impulse coefficient be adjusted using a method similar to a weighted average.

To make this adjustment, first we use the law of conservation for momentum to find the total impulse involved:

$$400\,J[0.5\,\rho/J] - 100J[1.5\rho/J] =$$
$$200\,\rho - \;150\,\rho\;=\;\mathbf{50\,\rho}$$

Next, the final impulse coefficient is calculated by dividing the impulse produced by the energy produced, as follows:

$$[IC] = \frac{impulse}{energy} \;=\frac{50\,\rho}{300\,J} = [0.167]$$

$$Total\ joules = \mathbf{300\ J_{[0.167]}}$$

"Simple enough," Devil's Advocate says, "And the obedience to the law of conservation for momentum can then be double checked, as follows:"

$$400\ J_{[0.5]} - 100\ J_{[1.5]}\ ??\ 300\ J_{[0.167]}$$
$$400[0.5] - 100[1.5]\ ??\ 300[0.167]$$
$$200\ \rho - 150\ \rho = 50\ \rho$$ ***Obeys momentum laws!***

300 $J_{[0.167]}$ means the average joule size is [0.167], the average joule involves 0.1667 ρ of impulse, with a speedy multiplier of $\frac{1}{[0.167]}$ = 6.0 m/s, and a joule production rate of $\frac{1}{[0.167\ \rho/J]}$, or 6.0 J/$\rho$.

As before, it should be noted that non-standard joules can be converted into standard joules using the equation:

$$(\text{standard J}) = \frac{(Joules)[IC]}{1.185}$$

In the above:

$$400\ J_{[0.5]}\ \text{becomes}\ \frac{400[0.5]}{1.185} = 168.8\ J_{[1.185]}$$
$$100\ J_{[1.5]}\ \text{becomes}\ \frac{100[1.5]}{1.185} = 126.6\ J_{[1.185]}$$

These standardized joule values can be added and subtracted without violating the law of conservation for momentum.

Special impulse-joule relationships

As mentioned earlier, in the mid 1800's James Prescott Joule codified the mathematical relationship between impulse and linearized calorie-joules as 1.185 ρ/J, or 0.84 J/ρ. Fortunately, this impulse-joule ratio extends to electric-joules, light-joules, chemical-joules, and even nuclear-joules. As a result, most scientific activity involves standard linearized joules and the impulse coefficient of [1.185].

Therefore, anything expressed in linearized joules can also be expressed as ρ of impulse. For example, the common unit for electric energy, 1 kWh, can be expressed in terms of impulse:

$$1\ kWh = [1.185\ \tfrac{\rho}{J}]\ (1000)(1\ \tfrac{J}{s})(3600\ s)$$
$$1\ kWh = 4.266\ M\rho\ of\ electric\ impulse$$

This reinforces the realization that energy is speed-infused impulse, and standard linearized joules are a scalar expansion of the impulse used.

The generation of light energy also involves impulse. Scientists measure light energy in terms of standard calorie-joules and standard electric-joules. Therefore, the amount of impulse needed to generate a light wave can be found using the appropriate adjustment to Planck's constant:

$$im\Delta\rho = [1.185\ \tfrac{\rho}{J}]\ E$$

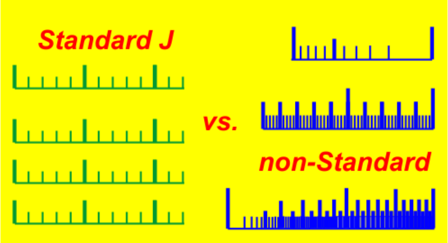
$$Planck's\ im\Delta\rho\ constant = [1.185\ \tfrac{\rho}{J}](6.626 \times 10^{-34}\ Js)$$
$$light\ im\Delta\rho = [(1.185\ )(6.626 \times 10^{-34}\ \rho s)]f$$

“Once again,” Devil’s Advocate says, “standard linearized joules are a mathematical expansion of the impulse used to make the joules. Calorie-joules are speedy impulse, electric-joules are speedy impulse, light-joules are speedy impulse, and nuclear-joules are speedy impulse.”

Not only that, nuclear energy is normally expressed in terms of heat-joules and light-joules produced. By definition joules are speedy impulse, so nuclear energy is a mathematical expansion of nuclear impulse. Expressed in terms of Einstein’s equation:

$$im\Delta\rho = [1.185\ \tfrac{\rho}{J}]\ E$$
$$nuclear\ im\Delta\rho = [1.185\ \tfrac{\rho}{J}]mc^2$$
$$nuclear\ im\Delta\rho = [1.185](3.000 \times 10^{8}\ )mc$$
$$nuclear\ im\Delta\rho = (3.555 \times 10^{8}\ )mc$$

Even nuclear-joules are a measure of impulse in action,” Devil’s Advocate says, “light-joules are impulse in action, electric-joules are impulse in action, and calorie-joules are a measure of impulse in action.”

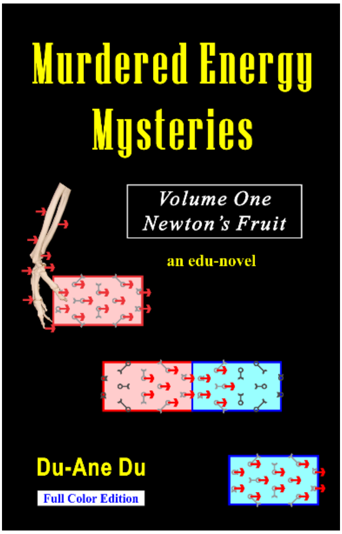


CONCLUSION 1: **Third Duality Law of non-Standard Energy Sizes and Varying Productivity:** As the result of Joule's original definitions and experiments, the international treaty for units and measurements contains an unclarified assumption that energy and work are always measured at a fixed speed of 1 ft/s [English] and a fixed productivity of 0.84 J/ρ. Inconsistent adherence to that unclarified assumption has resulted in measurements that may be (1) standard linearized, with an impulse coefficient [IC] = 1.18, or (2) multiple-linear, resulting in a wide variety of non-standard joule sizes, or (3) multi-parabolic, resulting in an infinite variety of continually changing non-standard joule sizes. (Addition or subtraction of non-standard joule sizes can produce answers that violate the law of conservation for momentum.)

CONCLUSION 2: Notating the [IC] impulse coefficient on all joules measurements clearly identifies the average joule size, percent impulse, inverse speed, and inverse productivity—thereby resolving the problems caused by non-standardization. Calculations that fail to properly track the impulse involved will likely produce answers that violate the law of conservation for momentum!

700 $J_{[1.185]}$ means the average joule size is [*1.185*], *the average joule involves 1.185 ρ of impulse, with a speedy multiplier of $\frac{1}{[1.185]}$ =0.84 m/s, and a productivity of $\frac{1}{[1.185\ \rho/J]}$, or 0.84 J/$\rho$.* Non-standard joules can be converted to standard joules using the equation: (standard J) = $\frac{(Joules)[IC]}{1.185}$

CONCLUSION 3: In Article 2, "Second Duality Law of Perceived Speedy-Impulse", it was found that energy is a (profit oriented, psychological) joint perception of average speed and impulse used, speed infused effort, or speedy impulse. (1) In the case of standard linearized electric-joules, calorie-joules, light-joules, and nuclear-joules the impulse coefficient is always [1.185 ρ/J]. Therefore, standard linearized energy is primarily a psychological perception of impulse in action. (2) In the case of work done at non-standard speeds, energy is primarily a perceived speed-variant of impulse in action. (3) In the case of lighter objects with high accelerations, energy is an impulse-variant of the average speed.



CONCLUSION 4: More research needs to be done into the relationship between mechanical energy and other theoretical forms of energy. Many common beliefs may actually be philosophical myths.

Murdered Energy Mysteries is an edu-novel that seeks to increase understanding of the various forms of momentum and momentum transfer, as well as the various forms of energy and energy transfer. The lack of understanding on the part of the scientific community is substantial, and more research needs to be done.

—Du-Ane Du, author of the edu-novel *Murdered Energy Mysteries* (Amazon, Kindle, e-book 2018, paperback 2021.)

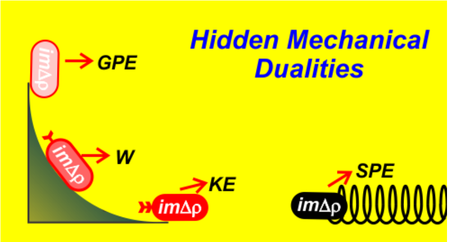
For more information, see:

Murdered Energy Mysteries, as well as:

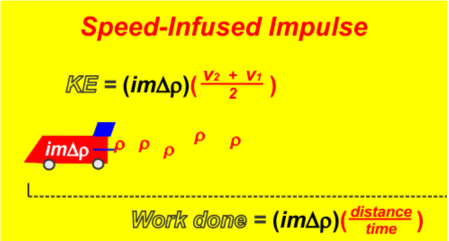
Six Duality Laws of Momentum and Energy

Guide for improving standards.

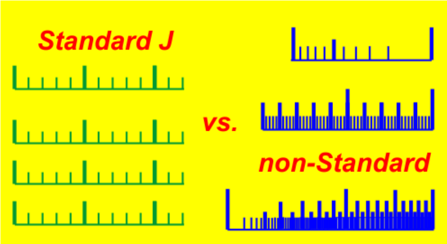
Article 1: First Duality Law of Momentum-Energy Coexistence



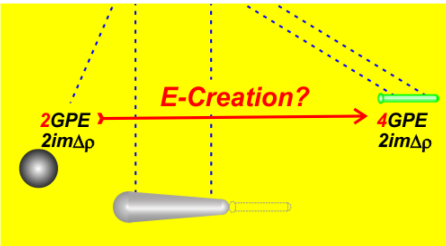
Article 2: Second Duality Law of Perceived Speedy-Impulse



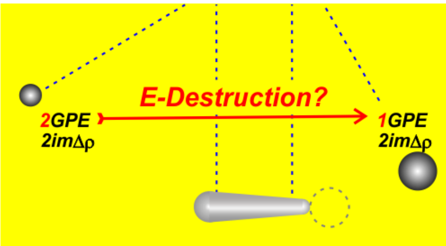
Article 3: Third Duality Law of non-Standard Energy Sizes and Varying Productivity



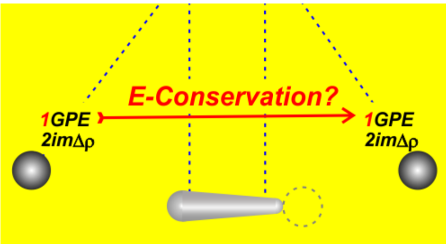
Article 4: Fourth Duality Law of Situational Energy Creation



Article 5: Fifth Duality Law of Situational Energy Destruction



Article 6: Sixth Duality Law of Situational Energy Conservation & Einstein



These advanced articles and less complex discussions of these topics are available at: www.Wacky1301SCI.com