Abstract 2021

Inertial Frame of reference

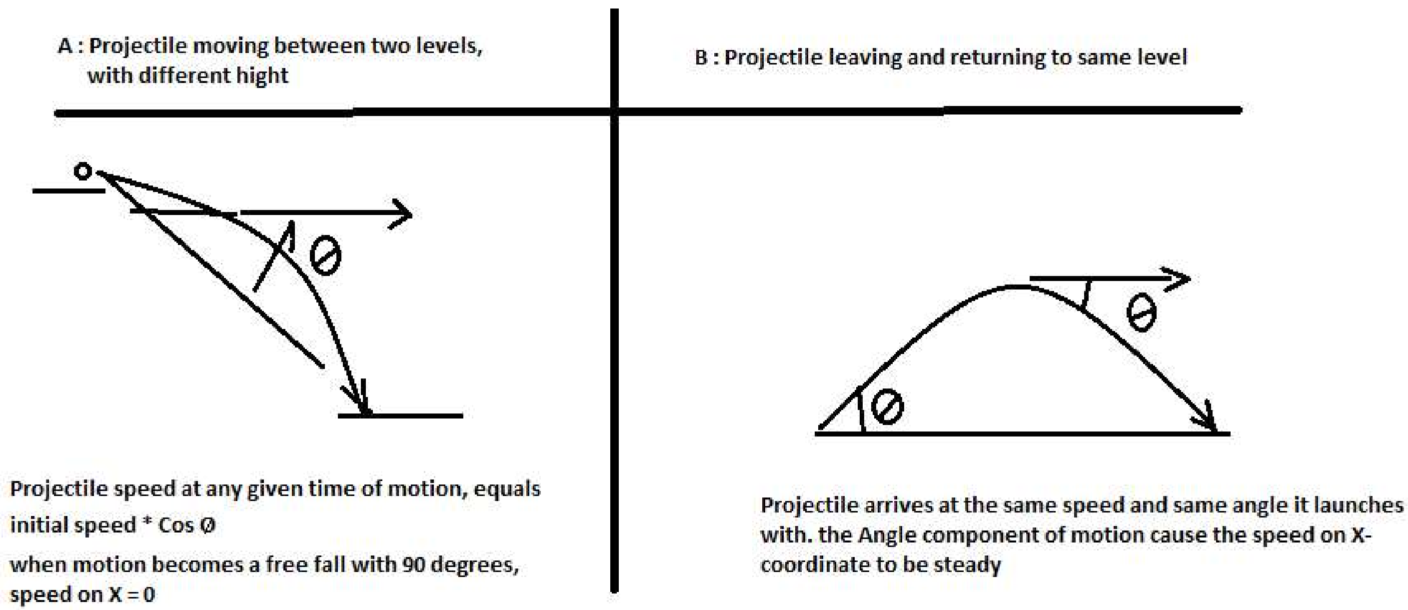
Presentation is copyright protected

Author
Ibrahim Hanna
self

- A mathematical example of incorrect management of acceleration vectors is the Special Relativity Assumption that if a train rider drops a stone off his carriage while moving in a uniform motion, he will see it moving in a straight line. However, the better expectation, mathematically, is that he will see it moving in a parabola, just like any other outside observer. When either an observer or a projectile, subjected to at least one different acceleration, the observed path of projectile follows a mathematical equation of the second degree, which represent a parabolic curve line on an (X-Y) coordinates.
- Relativity as a Function of Time can solve observation-scientific rules challenges, when building co-ordinate systems

Projectile motion and velocity on X-coordinate

- Several physics books teach that a projectile will maintain its initial velocity, without mentioning that velocity on the x coordinate decreases when the projectile moves between a higher and lower level, where **velocity on X = initial velocity * cos- angel of motion** at any given time.
- While the projectile makes a positive gravity acceleration on y (negative Y coordinate of g) , it makes a negative acceleration on x, with velocity on X= 0 when motion becomes parallel with y coordinate.
- The distance the projectile makes on X, X1(t)= V0*Cos$^{\theta}$ *t.



How students learn to calculate "Horizontal Range" of a projectile in physics books.

- A Quote from one of the physics books:

"…..The marble will roll off with a certain speed, say, Vx= 2 m/s. If the tabletop is 0.5 meters above the floor, how far from the edge of the table does the marble hit the floor? ……….. Since vx is constant, the horizontal distance is simply the product of horizontal speed and the elapsed time. In other words: $\Delta x = vxt$..."

Not all books teach the subject correctly, and some do, where velocity on X of a projectile moving between two levels, decreases as the angle of motion increases relevant to x-coordinate of the ground, and initial velocity shall be subjected to changes of angle, and how far a projectile goes on X co-ordinate $x(t) = V0 * Cos^{\theta} * t$

Special Relativity incorrect assessment of a projectile velocity on X-coordinate

- Special Relativity Quote : “I sit at the window of a railway carriage, which is travelling **uniformly,** and drop a stone down on the embankment, without throwing it. Then, disregarding the influence of the air resistance, I see the stone descend in a straight line. A pedestrian who observes the action from the footpath notices that the stone falls to the earth in a parabolic curve.”
- Einstein, Albert. Relativity: The Special and the General Theory (p. 6). GENERAL PRESS. Kindle Edition.

- Note: If the quote “disregarding the influence of air” refers that the stone velocity on X-coordinate shall not change, then such statement is not correct.
- If the statement considered the deceleration of the projectile on the x-coordinate, then there was no need to mention “disregarding the influence of air,” and this explains that the statement is incorrectly presenting the physics of motion.
- Saying that the carriage is “traveling uniformly” and the carriage observer sees the projectile moving in a straight line means that the observer and projectile are aligned vertically at any given time of the motion. This means that we are considering a uniform projectile velocity on the x-coordinate, and that is not correct.

Calculated example

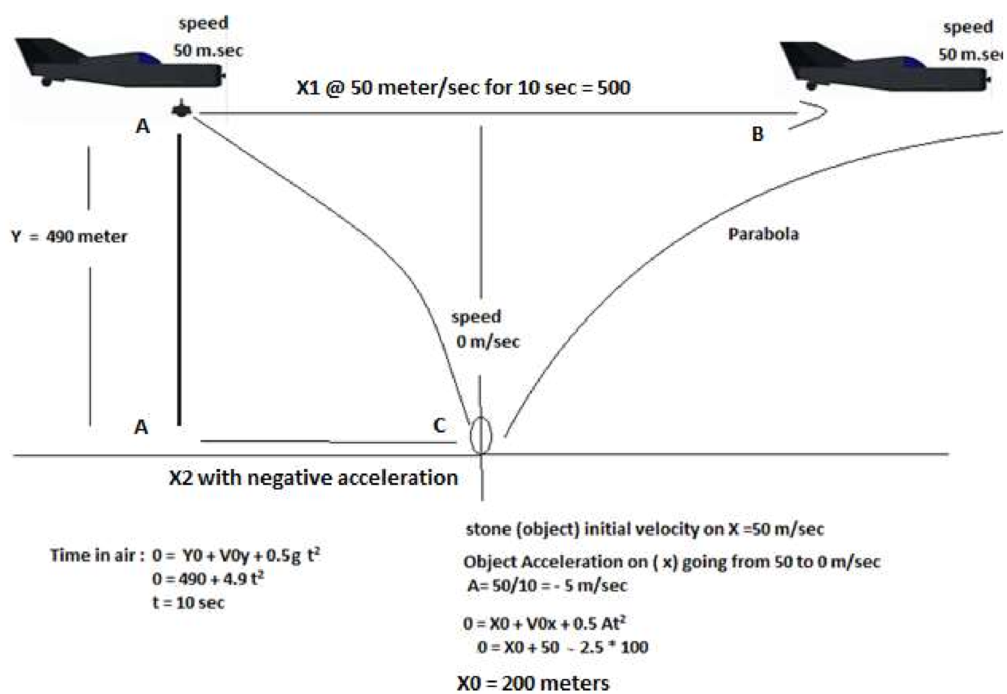
When a plane traveling in a uniform motion at 50 meter/ sec, at 490-meter elevation (Y=490 meter) drops at point A, a projectile with an initial speed of 50 m/sec above a flat surface (represented by x-coordinate) will suffer a negative acceleration on X until it reaches a vertical direction of a free-falling motion.
Even though the initial speed of the projectile on x can be considered 50 m/sec, the acceleration of gravity will put such object at an angle with the X-coordinate, where velocity is calculated as ($V_x = V_i * \cos^{\theta}$). Due to the angle with X continuously increasing, the velocity on X is continuously decreasing that is translated as a negative acceleration on X which depends in value on initial velocity and on elevation.

If the projectile hits the ground after 10 seconds, then we need to calculate two distances on X:

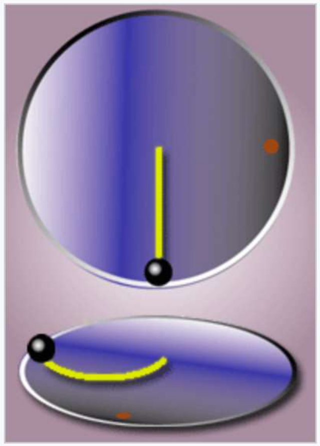
- X1=AB of the plane traveling for 10 seconds = 50 * 10 = 500 meter (plane traveling between points A ad B
- X2=AC of the projectile = 200 meter (for simplification, we considered it hits the ground with (velocity on x =0 which is not the case of this height and velocity)

The only way for the pilot to see the object traveling in a straight line is by slowing the plane down to be above point C on the X-coordinate after 10 seconds when the object hits the ground .

Mathematically, when the plane or Einstein's train takes a uniform motion, the train or plane observer's distance from the dropped object (X1- X2) is an equation of the second power. The distance recorded every split second for ten seconds between the plane and the object shall make a parabola on the frame X-Y; this parabola or curve will point in an opposite direction to the curve or parabola seen by a bystander.



Special Relativity comparison to Coriolis test and the understanding of Inertial frames



In the inertial frame of reference (upper part of the picture), the black ball moves in a straight line. However, the observer (red dot) who is standing in the rotating/non-inertial frame of reference (lower part of the picture) sees the object as following a curved path due to the Coriolis and centrifugal forces present in this frame.

Fig.1-Wikipedia

- The upper disc in Fig.1- from Wikipedia, is described as Inertial frame, where observer “red dot” and observed projectile “black ball” are subject to the same acceleration, meaning that acceleration can be mathematically ignored in counting the distance between the two. The observer will see black ball moving in a linear motion. Distance between the two follows the mathematical equation : $y=ax+b$
- The lower disc, described as non inertial frame of motion, where the observer “ red dot” is a non-moving bystander observer, not subject to disc acceleration, and will see motion of the black ball projectile to be moving in a curved parabola line. Distance between the two objects is subject to calculating acceleration of black ball. Distance between the two, is a mathematical equation of the second power: $y= ax^2 +b$

In the case of the Special Relativity example, Fig.2, a train rider observer (red triangle) drops a stone off the train. It is like in Coriolis lower disc example where the observer is independent from acceleration of gravity that is affecting the falling stone, and like a bystander must see the motion of the stone to be following a curve line or parabola, and the distance between the two, is a mathematical equation of the second power.

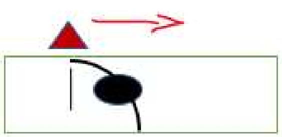


Fig.2

Inertial frames can not be used, rigidly attached or constructed by random observers, outside the equilibrium field of motion as we see incorrectly done in Special Relativity, building assumptions based on Coordinates attached to the train.

The Law of Inertia

- According to the Galelei-Newton law of inertia, : A body removed sufficiently far from other bodies continues in a state of rest or of uniform motion in a straight line

- According to Einstein, if stars were moving in a circular path within a system of coordinates rigidly attached to earth (where earth makes the vehicle of observation) then Newton's law of inertia would violate the laws of nature; This statement actually does not dispute the validity of classical mechanic capabilities of addressing the laws of nature, but instead disputes the validity of using reference frames of coordinates without first addressing how the observer relates to acceleration and equilibrium of motion in such such coordinates.
- If we return to the train carriage example, we disagree with Special Relativity that it is enough to observe a path of motion as a straight line or even a parabola, to build an inertial reference of coordinate system for such motion attached to observer's vehicle, unless the negative acceleration of the projectile on X is void as a vector by another negative acceleration of the train that is in the same direction and magnitude of the projectile's acceleration; and that needs us to correctly address acceleration vectors and equilibrium of the system, before we determine or XY coordinates.

As a result, we may conclude that, without addressing acceleration and equilibrium, an observer can not, in principle, build a frame of reference attached to his own vehicle when observing a curved path of motion without violating natural laws and principles of energy conservations, like we see done in some Space-Time presentations of why the moon does not fall to earth

Mathematical violations

- Special Relativity claimed that the rider of the train will see a dropped stone moving in a straight line, and incorrectly considered the distance between the observer and observed objects calculated as a first-degree equation (y= ax+b), meaning that the vector of acceleration of the projectile was ignored, and the system was incorrectly reduced to inertial frame of reference, in an incorrectly proposed co-ordinate system rigidly attached to the observer's vehicle.

- Based on a mathematical violation of managing the acceleration vector of a projectile, an inertial frame of reference attached to a train, the vehicle of the observer, was modeled in Special Relativity.
- Based on such frame of reference, the Newtonian-Relativity of straight lines of motion was disputed. However, for the same reason Special Relativity disputed Newtonian Relativity of straight lines of motion being a description of something does not happen under natural laws of objects moving under forces of the universe, we can similarly dispute the method of Special Relativity applying its observer's coordinate frames of Space-Time, not only due to the mathematical violation of inertial frames presented above, but also due to the violation of energy conservation principles that we face when a motion's path is calculated based on different clocks of different observes.

Special Relativity statement on Frame reference

- Special Relativity mathematically , in a system of co-ordinates attached to the train or carriage, where an observer sees the path of a dropped stone as claimed as a straight line, Einstein in his book proposes that “ there is no such thing as an independently existing trajectory,”

- This statement describes an art of observation but departs from the general purpose of mechanics.
- By saying, “There is no independently existing trajectory,” we will violate the energy conservation principles when motion is a function of position. Meaning energy spent or used during motion according to Special Relativity depends on observer’s measured path and observer’s own clock.
- For a statement to be scientific, it shall be independent of observation variables. For example, in the case of building coordinates around the motion of a projectile, the only scientific way we can consider is to build such coordinates, for the best of our knowledge, around the working force that is behind the motion of the falling stone where we can address the direction of gravity, the Newtonian universal time, the initial velocity in magnitude and direction, and the time of acceleration on both the X and Y coordinates.

Conclusion:

- We shall consider all observer-based coordinate systems, that is independent of observed forces or outside the field of equilibrium, as in the practice of Special Relativity, to be misleading if treated as a reference frame attached to any observer’s vehicle.
- Vectors of acceleration cannot be added or even used under a coordinate system attached to an observer’s vehicle, but instead coordinates shall first be defined by such vectors.
- Theories about cold expansion of universe, mathematically violate the laws of nature by incorrectly proposing observer’s Coordinates.

Proposals of new Relativity as a Function of Time

- A need exist to better build co-ordinate systems.
- Relativity as a Function of Time, using a universal time clock beside acceleration time clock of motion, can solve universe observation challenges and rules of inertial systems.
- accelerating an observer' vehicle in a way that can change observed path from a parabola to a straight line, becomes a scientific tool of Relativity as a Function of Time to study universe under inertial system rules.