Title: Perceived Downward Acceleration of Objects
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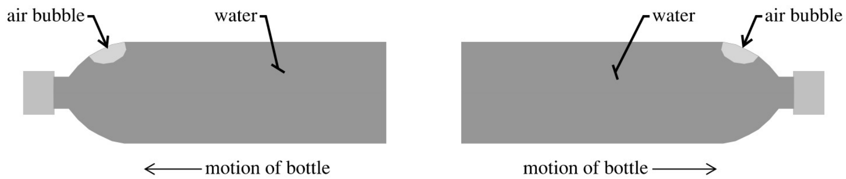
Abstract: Based on numerous physical experiments that can easily be performed by anyone, the arrangement of different matter of varying densities which are contained in a vessel are always arranged in a particular order when a force is applied to that vessel and that vessel is put into motion. The direction of the motion dictates the density gradient orientation. Based on other experiments it is also apparent that this arrangement of matter (based on density and dependent on the direction of motion) ceases when objects are in free fall. This would imply that when objects are in free fall there is no force present that is responsible for the apparent downward motion of objects, but rather the reference frame (earth) is moving upwards to meet the objects. This concept is explored (the upwards motion of the earth) and calculations are performed to understand how we (standing on earth) can perceive a downward acceleration (g) of objects in free fall if the earth is in motion upwards. Other concepts regarding the motion of the earth are also discussed.

Based on numerous physical experiments[1], the arrangement of different matter of varying densities which are contained in a vessel are always arranged in a particular order when a force is applied to that vessel and that vessel is put into motion. The direction of the motion dictates the density gradient orientation. For example, if the direction of motion is to the left then matter will orient itself from least dense being on the leftmost side and most dense being on the rightmost side.

This can be rudimentarily demonstrated with a water bottle (vessel) containing air and water, as shown below.

If a force is applied to the bottle which sets the bottle in motion to the left, then the air bubble will move to the left of the bottle.



If a force is applied to the bottle which sets the bottle in motion to the right, then the air bubble will move to the right of the bottle.

Many experiments have also been performed by the same channels in reference 1 that demonstrate that there is no force present acting on objects in "free fall". The arrangement of matter with varying densities (as described above and being the result of a force and resulting motion being present) ceases.

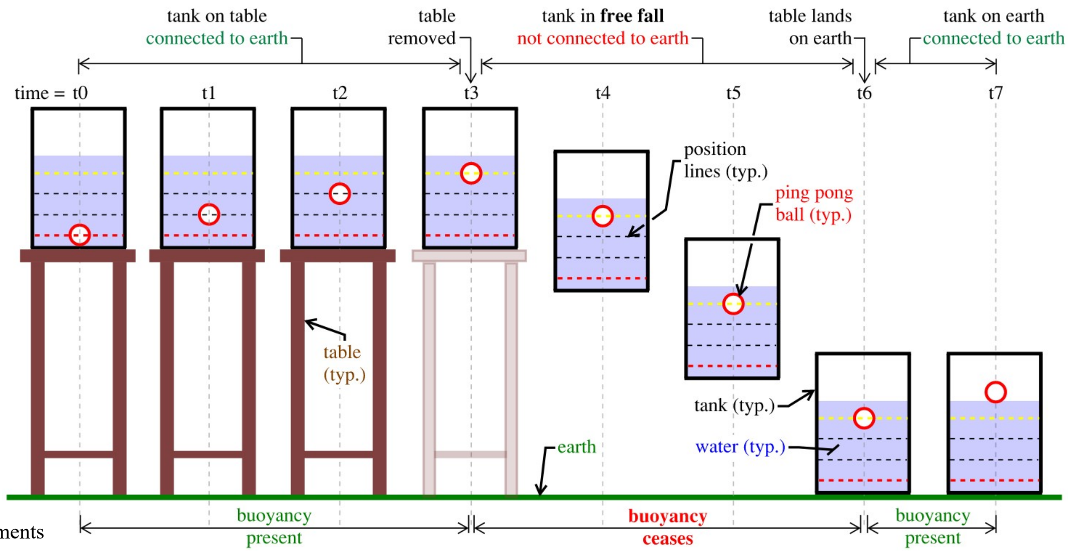
In the diagram to the right, at time = t0, there is an air-filled ping-pong ball (less dense than water) positioned at the bottom of a water-filled tank.

From t0 to t3, while the tank is on the table, matter arranges itself based on density. The ping-pong ball moves upwards (buoyancy).

At t3, the table is removed and from t3 to t6, the tank is in free fall. While in free fall, the ping-pong ball remains at the yellow position marker. The arrangement of matter based on density ceases. Buoyancy ceases.

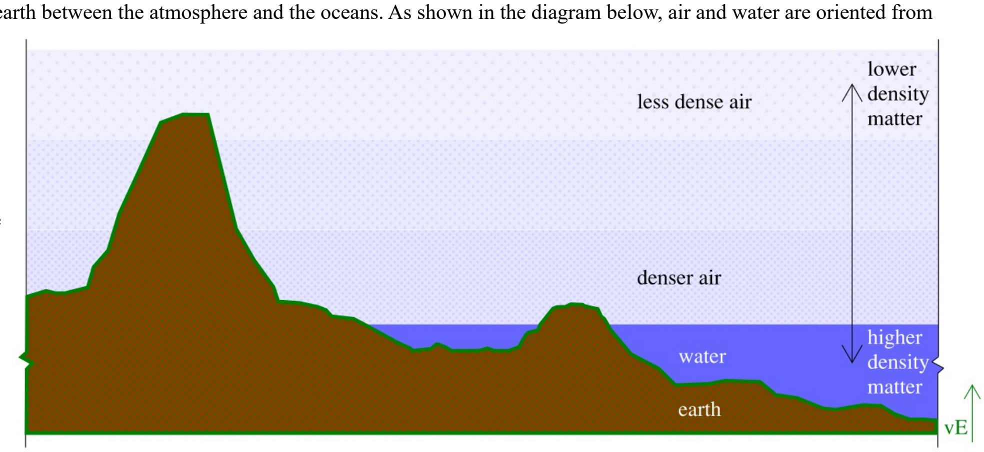
From t6 to t7, once the tank is on earth, matter arrangement resumes and the ball finishes its ascent to the surface.

This is similar to one of the many experiments provided on the channels in reference 1.



It is clear that while objects are in free fall, there are no forces present that are acting on the objects to cause the objects to move towards the earth. It appears more logical that instead, there is a lack of force on the objects during free fall.

It appears that the objects are moving upwards and decelerating and the earth is moving upwards to meet them and that this upwards motion of the earth is responsible for the density gradient that we see on earth between the atmosphere and the oceans. As shown in the diagram below, air and water are oriented from least dense (less dense air) to most dense (water) from top to bottom, which would imply an upward motion of the earth, v_E.

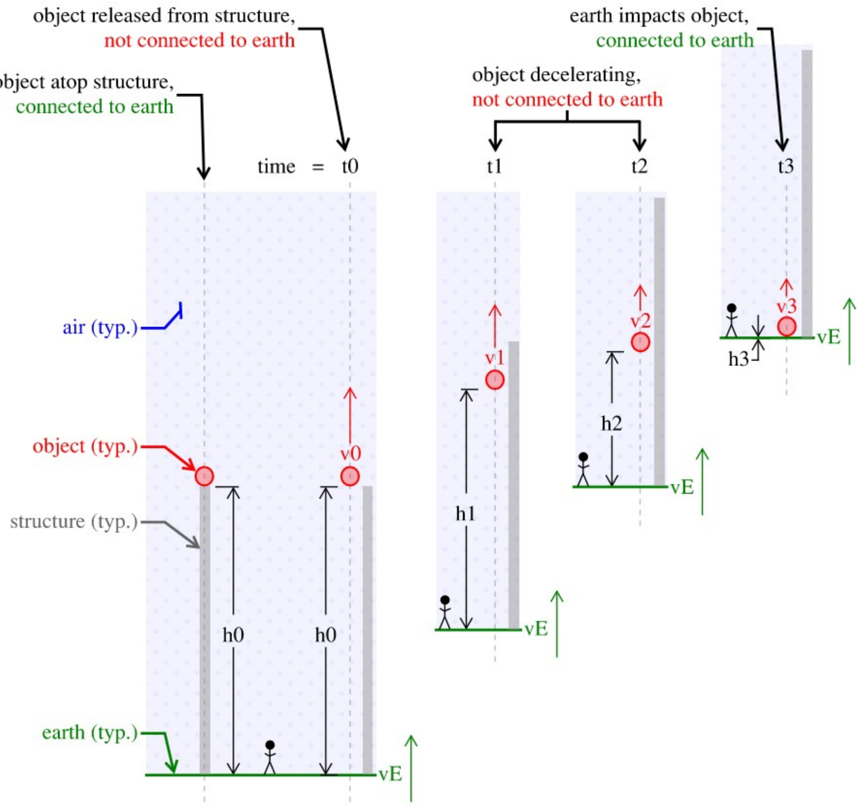


Using the Newtonian interpretation of gravity, it would be said that a gravitational force is acting on the tank (and all of the objects in the tank) to pull them downwards once the table is removed. If that were true and a force is present which is putting the vessel in motion downwards, the ping-pong ball would begin moving downwards through the water, but instead the ping-pong ball ceases motion and remains at the yellow position marker during free fall. When a force is present which sets a vessel in motion, if there is matter within that vessel of different densities, then that matter will always arrange itself based on density. The gravitational force would have to be an exception to this easily demonstrable fact.

The Einsteinian interpretation of gravity is not considered due to the mathematical and conceptual invalidation of special relativity theory[2], among numerous other fatal problems with Einstein's relativity theories (not discussed here, but easily findable online or in books[3,4,5,6]). So we are left with the Newtonian interpretation, that there is an attractive pulling force (with no identifiable physical mechanism) that is pulling matter towards the earth. Again, if this were the case, we would not witness buoyancy cease in free fall. It would also seem that there are no known pulling (or attractive) forces that can be demonstrated in our physical reality. This world is composed of matter in motion, that is all there is. Motion requires an applied force, more specifically, an applied pushing force (or an applied pressure: force/area). Basically, matter pressing on other matter is responsible for all the motion that we witness here on earth.

Based on these experiments[1], it is worthwhile to explore this upward motion of the earth and possibly see how this motion could result in the perceived acceleration, g, downwards that we see occurring in objects in free fall.

The diagram below represents an object (red circle) being dropped into "free fall" from atop a structure (grey rectangle). In this scenario, it is assumed earth is moving upwards at a constant velocity, v_E.



v_E = earth's upward constant velocity

v_0 = object velocity at time, t_0 (object released)

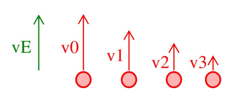
v_1 = object velocity at time, t_1, (object decelerating)

v_2 = object velocity at time, t_2, (object decelerating)

v_3 = object velocity at time, t_3 (object impacted by earth)

At the instant the object is released at time, t_0, the object still has the same velocity as earth's upward velocity, v_E. From there, the object begins to decelerate until the earth catches up to it and impacts it at t_3.

The object's velocity upwards decreases from t_0 to t_3: $v_E = v_0 > v_1 > v_2 > v_3$



The object begins to decelerate because the structure (that was once below it and applying a force upwards onto it) is no longer doing so once the object is released at t_0. Just like with all examples of matter in motion due to an applied force (or other matter pushing it), once the applied force is removed the matter does not continue moving indefinitely, it decelerates.

It could be that there is a substrate that permeates this world and all matter is "tied" to this substrate or that this substrate has a resistive effect which decelerates matter to rest when applied forces are no longer present. This substrate could be the same as the "material" left inside a contained man-made vacuum once all of the gas has been evacuated, the same in which light propagates and the same in which is affected by magnets.

Velocity difference, Δv_t, between earth and object:

at time = t_0:	$\Delta v_0 = v_E - v_0 = 0$	(object released)
at time = t_1:	$\Delta v_1 = v_E - v_1$	(object decelerating)
at time = t_2:	$\Delta v_2 = v_E - v_2$	(object decelerating)
at time = t_3:	$\Delta v_3 = v_E - v_3$	(object impacted by earth)

And since: $v_0 = v_E$ and $v_0 > v_1 > v_2 > v_3$, then $0 = \Delta v_0 < \Delta v_1 < \Delta v_2 < \Delta v_3$.

The observer on earth is moving upwards at the same speed as earth, at v_E. As time goes on, the velocity of the object decreases and therefore the velocity difference between the observer and the object, Δv_t, increases. This is the perceived increase in velocity, or acceleration, of objects "downward" that is called gravitational acceleration, g.

Scenario 1 Acceleration, velocity, and position of object in "free fall" from the observer's perspective on earth.

Acceleration, velocity, and position of earth:

$a_E := 0 \dfrac{\left(\dfrac{ft}{s}\right)}{s}$ $\quad v_E := 0 \dfrac{ft}{s}$ $\quad h_E := 0\ ft$

Acceleration, initial velocity, and initial position of object:

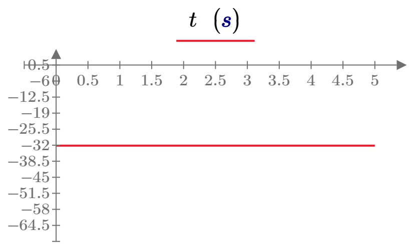
$a_O := -g = -32.17 \dfrac{\left(\dfrac{ft}{s}\right)}{s}$ $\quad v_{o.O} := v_E = 0 \dfrac{ft}{s}$ $\quad h_{o.O} := 80\ m = 262.47\ ft$

time / position of object / velocity of object

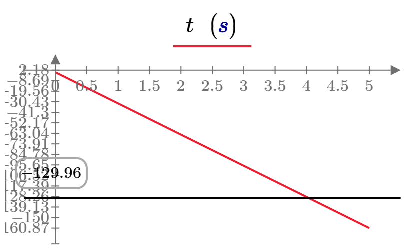
$$t := \begin{bmatrix} 0 \\ 0.5 \\ 1 \\ 1.5 \\ 2 \\ 2.5 \\ 3 \\ 3.5 \\ 4 \\ 4.5 \\ 5 \end{bmatrix} s \qquad h_O := h_{o.O} + v_{o.O} \cdot t + \frac{1}{2} \cdot a_O \cdot t^2 = \begin{bmatrix} 262.47 \\ 258.45 \\ 246.38 \\ 226.27 \\ 198.12 \\ 161.92 \\ 117.68 \\ 65.40 \\ 5.07 \\ -63.30 \\ -139.71 \end{bmatrix} ft \qquad v_O := v_{o.O} + a_O \cdot t = \begin{bmatrix} 0.00 \\ -16.09 \\ -32.17 \\ -48.26 \\ -64.35 \\ -80.44 \\ -96.52 \\ -112.61 \\ -128.70 \\ -144.78 \\ -160.87 \end{bmatrix} \frac{ft}{s}$$

$f1(x, y) := a_O$

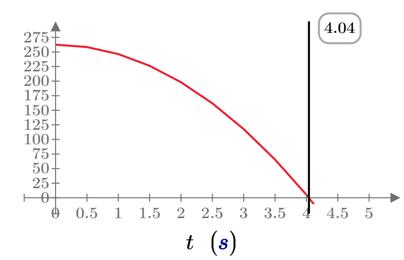
$a_{O.} := \text{matrix}(21, 1, f1)$



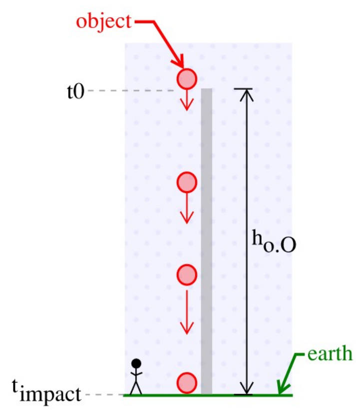
$a_{O.} \left(\dfrac{\left(\dfrac{ft}{s}\right)}{s}\right)$ object acceleration



$v_O \left(\dfrac{ft}{s}\right)$ object velocity



$h_O\ (ft)$ object position



This is the standard scenario of dropping an object from height from the perspective of someone on earth.

The person on earth perceives the object to accelerate in a downwards direction towards earth.

Time for object to impact earth (when $h_O = 0\ ft$)

Kinematic equation

$$h_O = 0 = h_{o.O} + v_{o.O} \cdot t_{impact} + \frac{1}{2} \cdot a_O \cdot t_{impact}^2$$

Solve for t_{impact} (use quadratic formula)

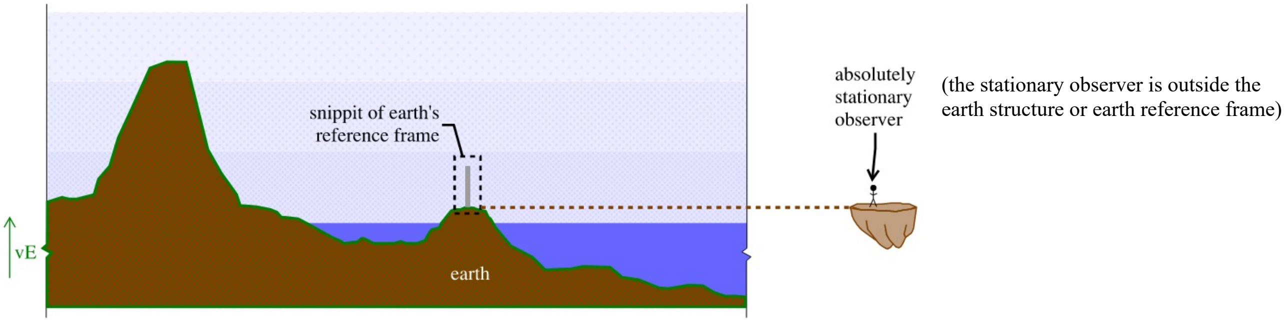
$$t_{impact} := \frac{-v_{o.O} - \sqrt{v_{o.O}^2 - 2 \cdot a_O \cdot h_{o.O}}}{a_O} = 4.04\ s$$

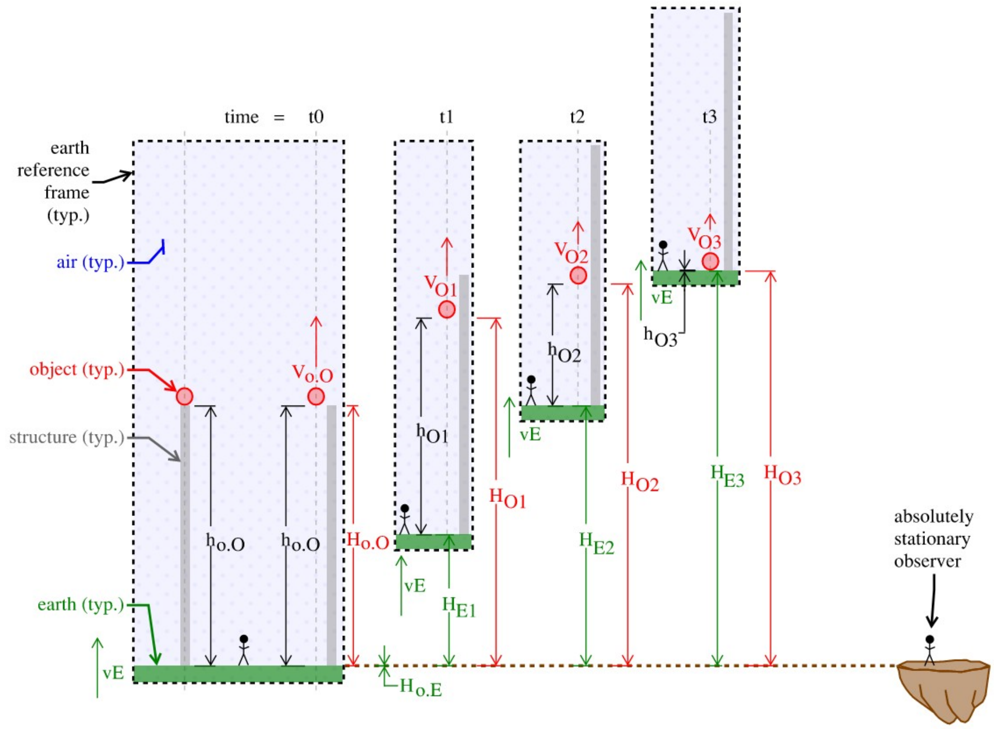
Velocity of object when it impacts earth

Plug t_{impact} into velocity equation

$$v_{impact} := v_{o.O} + a_O \cdot t_{impact} = -129.96 \frac{ft}{s}$$

Scenario 2 Acceleration, velocity, and position of object in "free fall" from an observer outside of the earth's reference frame.





Acceleration, velocity, and initial position of earth:

$A_E := 0 \frac{\left(\frac{ft}{s}\right)}{s}$ $v_E := 0.05 \frac{km}{s}$ $H_{o.E} := 0\ ft$

(assumed^) (assumed^)

Acceleration, initial velocity, and initial position of object:

$A_O = ?$ $V_{o.O} := v_E = 0.05 \frac{km}{s}$ $H_{o.O} := h_{o.O} = 262.47\ ft$

(unknown^)

Note: The value of earth's upward velocity is not known. A small random value is assumed for the purposes of displaying the position, velocity, and acceleration plots clearly on pages farther down in this document.

Time Position of earth Position of object

$$t = \begin{bmatrix} 0.0 \\ 0.5 \\ 1.0 \\ 1.5 \\ 2.0 \\ 2.5 \\ 3.0 \\ 3.5 \\ 4.0 \\ 4.5 \\ 5.0 \end{bmatrix} s \qquad H_E := H_{o.E} + v_E \cdot t + \frac{1}{2} \cdot A_E \cdot t^2 = \begin{bmatrix} 0.00 \\ 82.02 \\ 164.04 \\ 246.06 \\ 328.08 \\ 410.10 \\ 492.13 \\ 574.15 \\ 656.17 \\ 738.19 \\ 820.21 \end{bmatrix} ft \qquad H_O := H_E + h_O = \begin{bmatrix} 262.47 \\ 340.47 \\ 410.42 \\ 472.33 \\ 526.20 \\ 572.03 \\ 609.81 \\ 639.55 \\ 661.24 \\ 674.89 \\ 680.50 \end{bmatrix} ft$$

Scenario 2 (cont.) Acceleration, velocity, and position of object in "free fall" from an observer outside of the earth's reference frame.

A known variable that is the same in each scenario (1 & 2) is the time for the object and earth to meet, $t_{impact} = 4.04\ s$.

Velocity of object at impact $\quad V_O = V_{o.O} + A_O \cdot t_{impact} \quad$ (V_O and A_O unknown)

Rearrange, solve for object acceleration, A_O, at impact

$$A_O = \frac{V_O - V_{o.O}}{t_{impact}}$$

Another equation for height of object at impact

$$H_O = H_{o.O} + V_{o.O} \cdot t_{impact} + \frac{1}{2} \cdot A_O \cdot t_{impact}^2 \quad (A_O \text{ unknown})$$

Plug in A_O from rearranged equation above, and solve for V_O

$$H_O = H_{o.O} + V_{o.O} \cdot t_{impact} + \frac{1}{2} \cdot \left(\frac{V_O - V_{o.O}}{t_{impact}} \right) \cdot t_{impact}^2 \quad \text{-->} \quad H_O = H_{o.O} + V_{o.O} \cdot t_{impact} + \frac{1}{2} \cdot \left(V_O - V_{o.O} \right) \cdot t_{impact} \quad \text{-->}$$

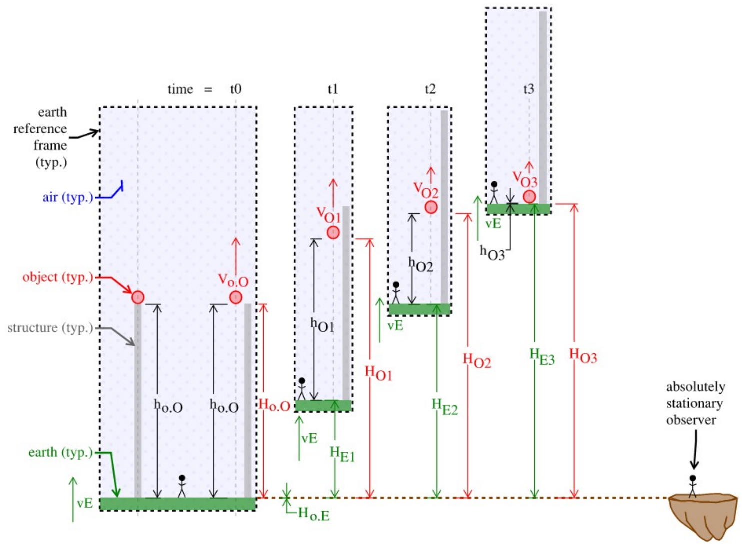
$$H_O = H_{o.O} + V_{o.O} \cdot t_{impact} + \frac{1}{2} \cdot \left(V_O - V_{o.O} \right) \cdot t_{impact} \quad \text{-->}$$

$$H_O = H_{o.O} + V_{o.O} \cdot t_{impact} + \frac{1}{2} V_O \cdot t_{impact} - \frac{1}{2} V_{o.O} \cdot t_{impact} \quad \text{-->}$$

$$\frac{1}{2} V_O \cdot t_{impact} = H_O - \frac{1}{2} V_{o.O} \cdot t_{impact} - H_{o.O} \quad \text{-->}$$

$$V_O \cdot t_{impact} = 2 \cdot H_O - V_{o.O} \cdot t_{impact} - 2 \cdot H_{o.O} \quad \text{-->}$$

$$V_O = \frac{2 \cdot H_O}{t_{impact}} - V_{o.O} - \frac{2 \cdot H_{o.O}}{t_{impact}}$$



Need known variables which correspond to impact time

$$H_E := H_{o.E} + v_E \cdot t_{impact} + \frac{1}{2} \cdot A_E \cdot t_{impact}^2 = 662.6\ ft$$ (earth position with respect to stationary observer)

$$h_O := h_{o.O} + v_{o.O} \cdot t_{impact} + \frac{1}{2} \cdot a_O \cdot t_{impact}^2 = 0\ ft$$ (object position with respect to observer on earth)

$$H_O := H_E + h_O = 662.6\ ft$$ (object position with respect to stationary observer)

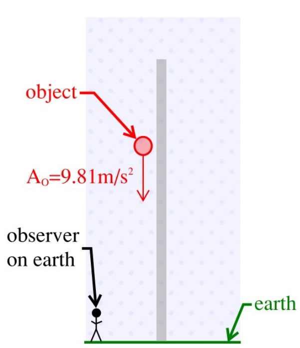
Velocity of object at impact time

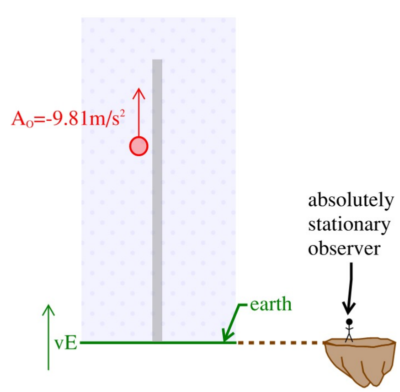
$$V_{O.impact} := \frac{2 \cdot H_O}{t_{impact}} - V_{o.O} - \frac{2 \cdot H_{o.O}}{t_{impact}} = 34.08\ \frac{ft}{s}$$

Deceleration of object

$$A_O := \frac{V_{O.impact} - V_{o.O}}{t_{impact}} = -32.17\ \frac{\left(\frac{ft}{s}\right)}{s} \qquad A_O = -9.81\ \frac{\left(\frac{m}{s}\right)}{s}$$

From the **perspective of the observer on earth**, the object appears to move downwards and accelerate at a magnitude of $g = 9.81\ \frac{m}{s^2}$.





From the **stationary observer's perspective outside of earth's reference frame** the object is moving upwards and decelerating at a magnitude of $A_O = -9.81\ \frac{m}{s^2}$.

Scenario 2 (cont.) Acceleration, velocity, and position of object in "free fall" from an observer outside of the earth's reference frame.

Position of Earth

$$H_E := H_{o.E} + v_E \cdot t + \frac{1}{2} \cdot A_E \cdot t^2 = \begin{bmatrix} 0.00 \\ 82.02 \\ 164.04 \\ 246.06 \\ 328.08 \\ 410.10 \\ 492.13 \\ 574.15 \\ 656.17 \\ 738.19 \\ 820.21 \end{bmatrix} ft$$

Velocity of object

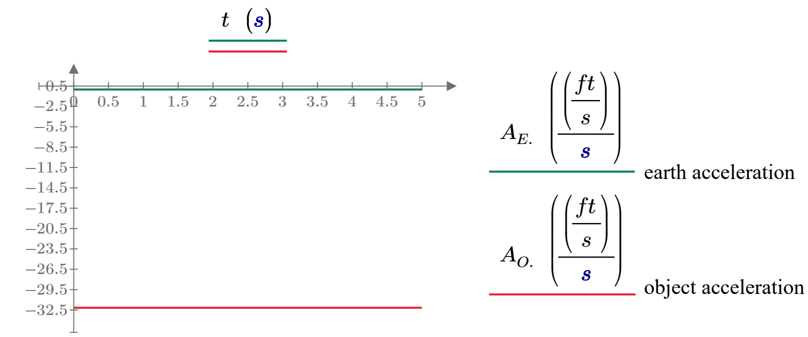
$$V_O := V_{o.O} + A_O \cdot t = \begin{bmatrix} 164.04 \\ 147.95 \\ 131.87 \\ 115.78 \\ 99.69 \\ 83.61 \\ 67.52 \\ 51.43 \\ 35.35 \\ 19.26 \\ 3.17 \end{bmatrix} \frac{ft}{s}$$

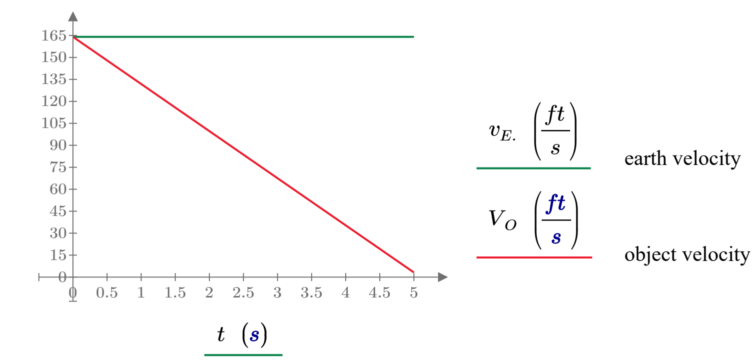
Position of object

$$\overrightarrow{H_O := H_{o.O} + V_{o.O} \cdot t + \frac{1}{2} \cdot A_O \cdot t^2} = \begin{bmatrix} 262.47 \\ 340.47 \\ 410.42 \\ 472.33 \\ 526.20 \\ 572.03 \\ 609.81 \\ 639.55 \\ 661.24 \\ 674.89 \\ 680.50 \end{bmatrix} ft$$

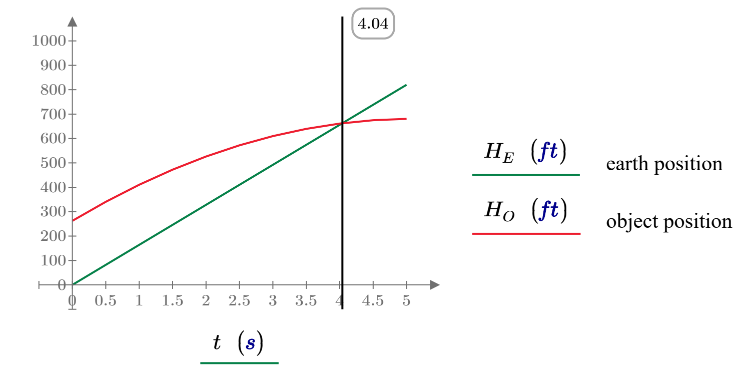
$f0(x, y) := A_E$ $\quad f1(x, y) := A_O$ $\quad f2(x, y) := v_E$

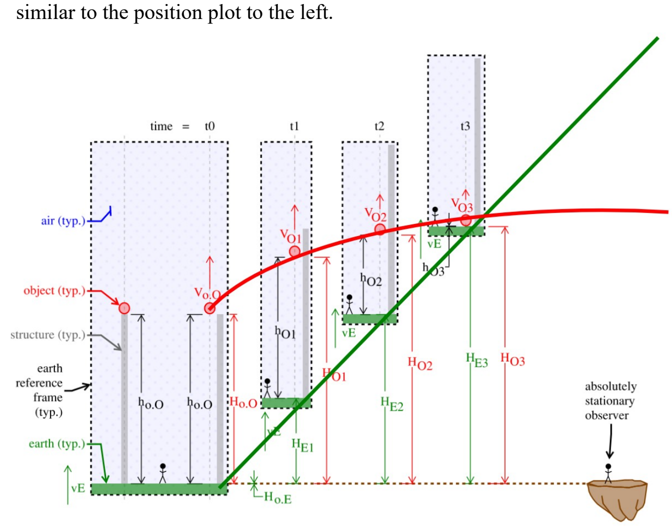
$A_{E.} := \text{matrix}(21, 1, f0)$ $\quad A_{O.} := \text{matrix}(21, 1, f1)$ $\quad v_{E.} := \text{matrix}(21, 1, f2)$ $\quad$ (putting constant values into matrix form for plotting)





Sketch from farther up in paper showing the object and earth positions, similar to the position plot to the left.





The point of impact where the earth rises to meet the decelerating object is the point of intersection of the two lines in the position plot, which occurs at time = $t_{impact} = 4.04\ s$.

The calculated object deceleration rate (from the perspective of an observer outside of earth's reference frame) will always be computed as $A_O = -9.81\ \frac{m}{s^2}$, regardless of the velocity of earth, v_E, that is input because A_O is a function of v_E.

Terminal Velocity Example

The idea of objects reaching terminal velocity when they are accelerating downwards in the standard interpretation of gravity (Scenario 1) can also be interpreted from the perspective of the stationary observer outside of earth's reference frame (Scenario 2).

Time $t := \begin{bmatrix} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \end{bmatrix} s$

Velocity of earth $v_E := 0.05 \frac{km}{s} = 164.04 \frac{ft}{s}$

Initial object velocity $V_{o.O} := v_E = 0.05 \frac{km}{s}$

Initial object height (height of structure from which object is released) $H_{o.O} := h_{o.O} = 262.47\ ft$

Position of Earth

$$H_E := H_{o.E} + v_E \cdot t + \frac{1}{2} \cdot A_E \cdot t^2 = \begin{bmatrix} 0.00 \\ 164.04 \\ 328.08 \\ 492.13 \\ 656.17 \\ 820.21 \\ 984.25 \\ 1148.29 \\ 1312.34 \end{bmatrix} ft$$

Velocity of object

$$V_{O.}(t) := \text{if } V_{o.O} + A_O \cdot t < 0 \;\; \| \; 0 \;\; \text{else} \;\; \| \; V_{o.O} + A_O \cdot t$$

$$V_{O.} := \overrightarrow{V_{O.}(t)} = \begin{bmatrix} 164.04 \\ 131.87 \\ 99.69 \\ 67.52 \\ 35.35 \\ 3.17 \\ 0.00 \\ 0.00 \\ 0.00 \end{bmatrix} \frac{ft}{s}$$

(When the object finishes decelerating, the velocity is 0.)

Terminal velocity occurs when the velocity of the object, V_O, is equal to 0. The object has finished decelerating (moving upwards) and is at rest with respect to the stationary observer.

$V_{O.term} := 0 \frac{ft}{s}$ $\quad A_O = -32.17 \frac{ft}{s^2}$ $\quad V_{o.O} = 164.04 \frac{ft}{s}$

Setting the velocity of the object equal to 0 and knowing the object's initial velocity and acceleration, the corresponding time can be calculated.

$$t_{term} := \frac{V_{O.term} - V_{o.O}}{A_O} = 5.1\ s$$

(time it takes object to reach terminal velocity)

Position of object

$$H_{O.}(t) := \text{if } V_{o.O} + A_O \cdot t < 0 \;\; \| \; H_{o.O} + V_{o.O} \cdot t_{term} + \frac{1}{2} \cdot A_O \cdot t_{term}^{\ 2} \;\; \text{else} \;\; \| \; H_{o.O} + V_{o.O} \cdot t + \frac{1}{2} \cdot A_O \cdot t^2$$

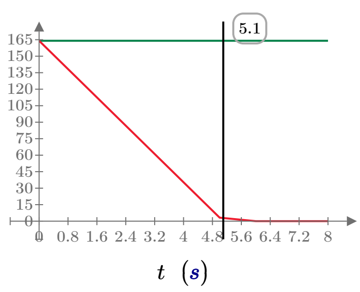
$$H_{O.} := \overrightarrow{H_{O.}(t)} = \begin{bmatrix} 262.47 \\ 410.42 \\ 526.20 \\ 609.81 \\ 661.24 \\ 680.50 \\ 680.66 \\ 680.66 \\ 680.66 \end{bmatrix} ft$$

Time when earth impacts object $\quad t_{impact} := \frac{-V_{O.term} - \sqrt{V_{O.term}^{\ 2} - 2 \cdot A_O \cdot H_{o.O}}}{A_O} = 4.04\ s$

Height of object when terminal velocity is reached $\quad H_{O.term} := H_{o.O} + V_{o.O} \cdot t_{term} + \frac{1}{2} \cdot A_O \cdot t_{term}^{\ 2} = 680.66\ ft$

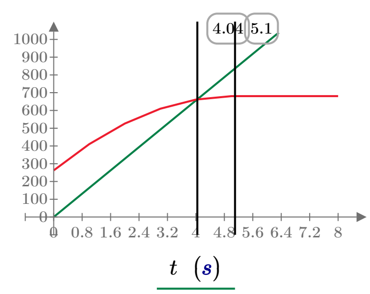
$f2(x, y) := v_E$

$v_{E.} := \text{matrix}(21, 1, f2)$ (putting constant value into matrix form for plotting)



$v_{E.}\ \left(\frac{ft}{s}\right)$ earth velocity

$V_{O.}\ \left(\frac{ft}{s}\right)$ object velocity



$H_E\ (ft)$ earth position

$H_{O.}\ (ft)$ object position

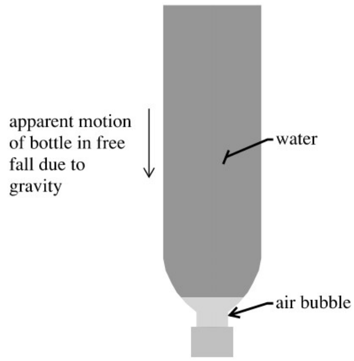
At time, $t_{impact} = 4.04\ s$, and at height, $H_{O.term} = 680.66\ ft$, the object has completely decelerated with respect to the stationary observer and the stationary substrate. In reality, once the earth impacts the object at $t_{impact} = 4.04\ s$, the object's position (red curve in position plot) will follow the earth's position (green line).

Further Questions

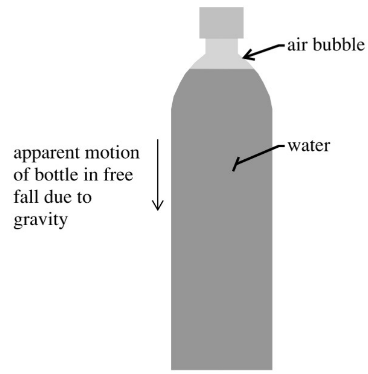
-Regarding the arrangement of matter of varying densities contained within a vessel in which a force is applied to that vessel which puts that vessel into motion:

Using the Newtonian understanding of gravity, a gravitational force acts on all matter. This gravitational force (again with no identifiable physical mechanism) allegedly "pulls" all objects towards the earth. Gravity somehow applies a force to all matter which then accelerates this matter downwards. As discussed earlier, matter will arrange itself based on density in an orientation which corresponds to the direction of the motion (due to an applied force). So for objects being pulled downwards, the direction of motion is downwards so the matter should orient itself as shown in the diagram below (on the left).

However, this is not what we witness in reality. If a bottle filled with water and an air bubble is dropped into free fall, the matter will orient itself as shown in the diagram below (on the right).



This diagram shows how matter would arrange itself if undergoing an acceleration in the downwards direction due to an applied force (which is how gravity is said to act).



This diagram shows how matter behaves in reality when the bottle is in free fall which shows there is no force being applied to the bottle or any of the contents within the bottle.

There is no force acting on objects in free fall. The objects are still moving upwards (relative to the stationary substrate) and they are decelerating. Matter rearrangement does not take place during this deceleration because there is no longer an applied force present. The matter will stay in the arrangement it was in at the last instant a force was still being applied to it. Refer to this experiment[7] for a physical demonstration of this.

-Regarding the constant upward velocity of earth:

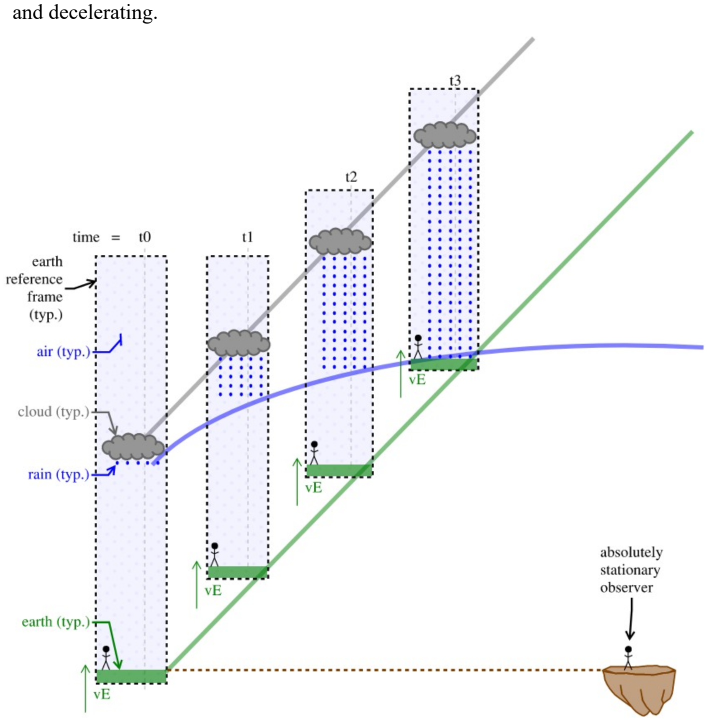
It could be that whatever or whoever created this place began with creating the earth structure and then accelerated the earth structure to reach a constant velocity upwards. This initial acceleration would explain how matter on earth was initially arranged (least dense air at the top, most dense air near the earth surface, and then water and ground at the bottom). The ensuing constant velocity maintains this arrangement. The constant velocity upwards also is what gives us our constant weight. A constant force from the constant upward moving earth is applied to the bottom of our feet when we are standing on a weight scale on earth and the reaction force from our body's weight is what the scale reads. If the earth was constantly accelerating upwards, our weight would be increasing (as can be demonstrated in an elevator accelerating upwards).

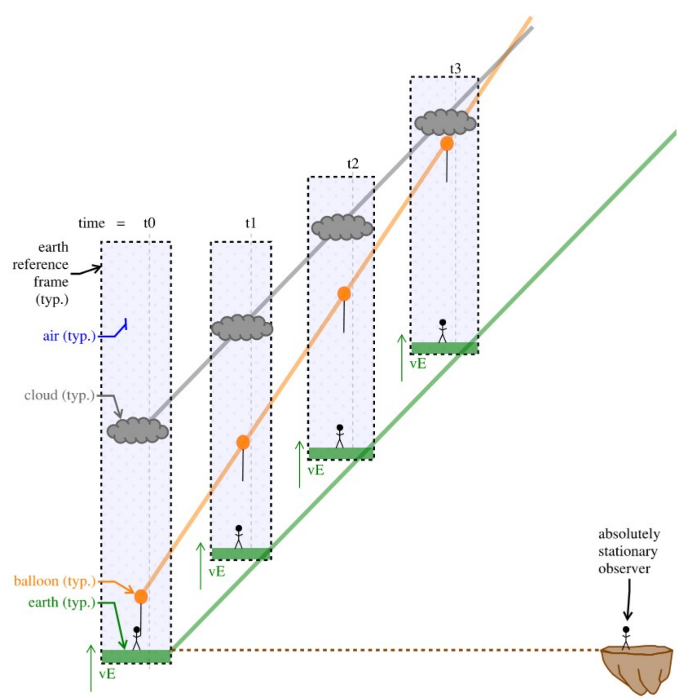
-Regarding clouds and rain:

The cloud is formed at some altitude due to air moisture content, temperature, surrounding air density, etc. Once rain is developed, it is arranged based on density due to the upwards earth motion. From the perspective on earth, the rain is falling down. From the perspective of the stationary observer, the rain is moving upwards and decelerating.

-Regarding helium balloons:

The air is being pushed up by the upward moving earth which in turn pushes the less dense (than air) balloon higher and higher. Whether the balloon accelerates or rises constantly is inconsequential for this concept. From each perspective the balloon is rising, just at different speeds.





Further Questions (cont.)

-High altitude balloons accelerating faster than g.

High altitude balloon experiments[8] have been performed which indicate a perceived downward acceleration (after the balloon pops at high altitude and the parachute is not immediately deployed) which exceeds the mainstream value of gravitational acceleration of $g = 32.17\ \frac{ft}{s^2}$.

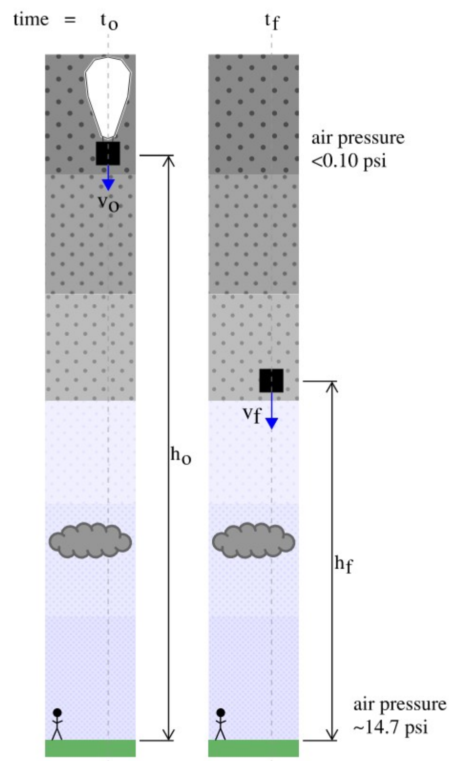
In these experiments, the balloons ascend into the sky by means of a less dense than air gas-filled balloon. Attached to the balloon are a video recorder and measuring instruments (which record time, altitude, vertical speed, air pressure, and other properties). Two experiments on the above referenced channel are examined (High Altitude Balloon #12 and #24). The balloons eventually reach a critical altitude where the balloons expand and pop due to the extremely low surrounding air pressure. Once the balloon pops, it begins to accelerate downwards from the perspective of someone standing on earth. Calculations are performed to determine the balloon's acceleration downwards from the instant the balloon pops to the instant the highest downward velocity is achieved. In most high altitude balloon experiments that can be viewed online a parachute is deployed quickly after the balloon pops, however in the below examples the deployment of the parachute is delayed allowing for a longer period of free fall to be examined.

<u>High Altitude Balloon #12</u>

	When balloon pops:	When balloon reaches max. downward velocity:	
Time	$t_o := 06\ hr + 32\ min + 29\ s$	$t_f := 06\ hr + 32\ min + 42\ s$	
Vertical speed	$v_o := 0\ mph$	$v_f := 505\ mph$	
Altitude	$h_{o.12} := 114563\ ft$	$h_{f.12} := 111931\ ft$	
Time difference	$\Delta t := t_f - t_o = 13\ s$		
Velocity difference	$\Delta v := v_f - v_o = 740.67\ \frac{ft}{s}$	$\Delta v = 225.76\ \frac{m}{s}$	
Acceleration	$a_{12} := \frac{\Delta v}{\Delta t} = 56.97\ \frac{ft}{s^2}$	$a_{12} = 17.37\ \frac{m}{s^2}$	(exceeds $g = 9.81\ \frac{m}{s^2}$)

<u>High Altitude Balloon #24</u>

	When balloon pops:	When balloon reaches max. downward velocity:	
Time	$t_o := 02\ hr + 14\ min + 18\ s$	$t_f := 02\ hr + 14\ min + 42\ s$	
Vertical speed	$v_o := 0\ mph$	$v_f := 671\ mph$	
Altitude	$h_{o.24} := 121200\ ft$	$h_{f.24} := 116800\ ft$	
Time difference	$\Delta t := t_f - t_o = 24\ s$		
Velocity difference	$\Delta v := v_f - v_o = 984.13\ \frac{ft}{s}$	$\Delta v = 299.96\ \frac{m}{s}$	
Acceleration	$a_{24} := \frac{\Delta v}{\Delta t} = 41.01\ \frac{ft}{s^2}$	$a_{24} = 12.5\ \frac{m}{s^2}$	(exceeds $g = 9.81\ \frac{m}{s^2}$)



Balloon descent from perspective of observer on earth.

If the instruments are recording correctly, then this is further evidence that gravity (as we are taught) does not exist. Balloon #12 popped at an altitude of $h_{o.12} = 114563\ ft$ and Balloon #24 popped at an altitude of $h_{o.24} = 121200\ ft$. At these altitudes, the air pressure is extremely low (<1 psi). At altitudes closer to the earth's surface the air pressure is closer to 14.7 psi.

When an object in free fall (with respect to the stationary observer outside of earth's reference frame) is moving upwards and decelerating at high altitudes, there is less dense air moving upwards (being pushed up by the upward moving earth) past and into the object and therefore the object will decelerate faster through this less dense air (there is less resistance to the object's deceleration). When an object is moving upwards and decelerating at lower altitudes, there is denser air moving upwards past and into the object and therefore the object will decelerate slower (more resistance to the object's deceleration).

Closing Remarks

Another experiment[9] was performed which indicated upward motion of the earth. In a similar fashion to the Michelson & Morley interferometer experiment[10] conducted in 1887, an interferometer was used. However, this time the interferometer was placed in a vertical orientation rather than a horizontal orientation (which is how Michelson & Morley's experiment was performed). Unfortunately there is no paper associated with the vertical interferometer experiment, however significant fringe shifts were apparent during the experiment unlike the less than expected fringe shifts which were recorded by Michelson & Morley. Michelson & Morley recorded fringe shifts which corresponded to a 6.7 km/s horizontal motion of the earth[2]. The fringe shifts apparent in the vertical interferometer experiment would correspond to a vertical motion much greater than 6.7 km/s. Based on these experiments it may be that the earth has a majorly upward motion with a slight horizontal motion.

The upwards motion of the earth can be logically deduced by things we can observe and practically demonstrate from within the earth reference frame (as discussed in this paper). This concept does not rely on magic (such as gravity, length contraction, and time dilation), nor does it require a redefinition of the concept of time and the creation of a four-dimensional spacetime like the heliocentric-globe model requires. A globe with water and gas magically sticking to it (while next to an infinite vacuum) spinning at 1000 mph, orbiting the sun at 67,000 mph, orbiting the center of the milky way galaxy at 500,000 mph, while the galaxy drifts through nothingness at 1,300,000 mph towards another galaxy is the current "scientific" creation story. And all of this allegedly came from nothing (big bang) 13,800,000,000 years ago, an inconceivable timeline for humans.

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