The Speed of Light is Not Fast Enough

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For travel between stars the universal speed limit simply is not fast enough. The astronomical distance called a light-year is the general measurement used for interstellar distances. A single light-year is the distance that light will travel in a single year, (approximately 9,454,254,955,488,000 m) (Gibbs, 1997). This astronomical number is often under estimated by the average person. To emphasize how far a light travels in a year consider that the light from the sun travels for approximately 8 minutes before reaching the earth. Furthermore, the nearest star, other than the sun, is α Centauri; however, even that star is 4.3 light-years away (Czysz & Bruno, 2006). Thus, at the speed of light it will require 4.3 years to travel there. It should also be noted that the light of the stars seen each night emitted the light being seen tens, hundreds, or even thousands of years ago. That star may not exist anymore; furthermore, some of the star light reaching the earth tonight was emitted early in the life of the universe. Therefore, the light that reaches the Earth provides a “fossil record” for the universe (Guidry, 2009).

The speed of light was an elusive number; as such, many experiments were performed to determine it. However, the speed of light was originally thought to be an infinite number, meaning that light travels between any two points instantaneously. However this hypothesis was proved false and the speed of light was found and refined. One of the first experiments involved light reflected off one of the moons of Jupiter. Danish astronomer Ole Römer observed that the eclipses were occurring at times earlier than predicted, and then the time became more accurate, then less accurate. He correctly hypothesized that the delay was caused by the differences in the distance in the distance between the Earth and Jupiter as they orbit. Another experiment was preformed where lantern light was projected between teeth in a gear. The light was reflected off of a mirror placed a large distance away, a few kilometers, and the light passed between two different teeth. Because the speed of the gear and the distances were known the speed of light could be calculated. The speed generated by this experiment was accurate to within 1.6 million meters per second. Another experiment, performed by Albert Michelson, refined the speed of light to within 48 thousand meters per second (Fowler, 2008). Now the accepted value for the speed of light is 299,792,458 meters per second (Gibbs, 1997).

The universal speed limit is well known as the speed of light, but few know why. Light speed is the fastest possible speed due, in part, to Einstein’s Theory of Special Relativity. A part of the theory says that as an object approaches the speed of light the mass of the object appears to increase towards infinity. Another contributing factor is Newton’s Second Law, which states that the force needed to accelerate the object is equal to the mass of the object multiplied by the acceleration the force will cause. Using these two principles the force required to accelerate an object to the speed of light is infinite; thus, the energy needed to generate that force is also infinite. The human race cannot generate an infinite amount of energy or an infinite amount of force; therefore, it cannot accelerate any object to the speed of light. However this works inversely, if an object is found traveling at the speed of light the human race is incapable of slowing it down. This is because the object traveling the speed of light will have an infinite amount of mass; thus, it requires an infinite amount of force to slow it down because of
Newton’s Second Law. (The scientific definition for acceleration is a change in velocity over time, whether the change in velocity is positive or negative.)

Despite the speed of light being too slow and unobtainable scientists continue to search for more ways to send humans further into space and in faster space vehicles. To achieve this many new propulsions systems are being designed. One theoretical propulsion system proposes Antimatter, a mirror opposite of normal matter. The combination of matter and antimatter results in a powerful explosion that would propel the spacecraft at two-thirds the speed of light (Weed, 2003). NASA, the National Aeronautics and Space Association is developing its own impressive propulsion system. The Variable Specific Impulse Magnetoplasma Rocket (VASIMR) works by ionizing hydrogen atoms, accelerating those atoms using magnetic fields, and ejecting them out of the rear of the space craft to propel it. This system is especially interesting because the fuel it uses can be found throughout the universe, meaning that in does not need to carry enough fuel for the entire journey. Rather the ship can refuel during the trip, extending how far the ship can travel (“Propulsion Systems of the Future”, 2003).

Light speed is insufficient for interstellar traveling. The distances are too vast to cover even at the fastest speed in the universe. The universal speed limit took time to calculate, but it was found and proven to be the unobtainable goal for high speeds. However, Scientists hold out hope of finding some form of space travel that will be practical for humans.

Literature Cited


