

Scientists are increasingly interested in warp engines, which 'space distortion' technology allows us to travel at the s

warp engines - the strange thing is that this motive is possible and doesn't seem to violate physical rules.

It is hard to live in a relativistic universe, where the distance to the nearest stars is extremely large and the speed of light is the absolute speed of all matter. So it's no wonder that science fiction works using self-paced FTL (Faster-than-Light - faster than light) technology to travel interstellar. With the push of a button, that engine system takes us to another dimension in the blink of an eye.

It seems unrealistic, but in recent years, the scientific community has become excited (and also very skeptical) about whether another fiction of interstellar travel technology is possible. It is the Alcubierre Warp Drive, a type of engine that can "distort" space to bring the spacecraft forward.

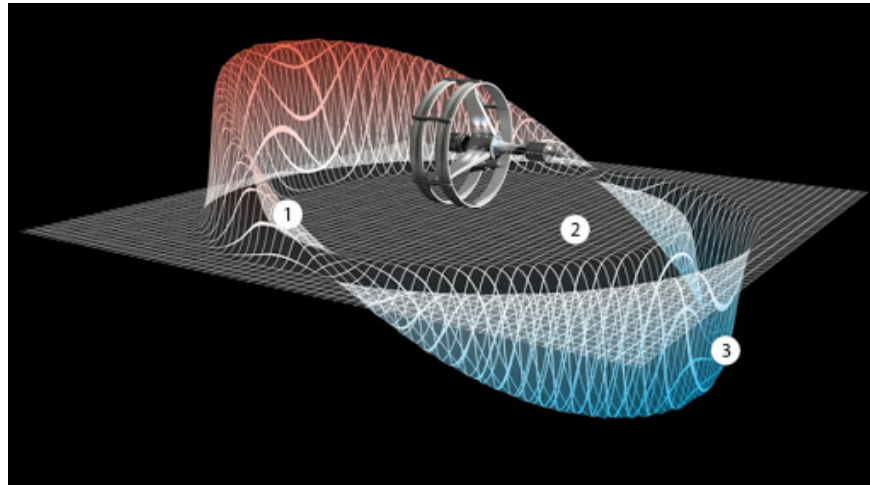
This is the subject of a presentation at the U.S. Aerospace and Space Forum 2019, which takes place from August 19 to 22 in Indianapolis by Joseph Agnew - a university engineer and assistant Research from the University of Alabama at Huntsville's Center for Dynamics Research (PRC) research.



Joseph Agnew is giving a presentation.

Agnew shared the results of a study he conducted, entitled *"Test of Warp theory, technology to determine technical status and feasibility,"* at a meeting titled *"The Future of Nuclear and groundbreaking thrust."* Agnew explained to all the audience in the hall that the theory behind the Warp Drive system was relatively simple.

Originally proposed in 1994 by Mexican physicist Miguel Alcubierre, this concept of a faster FTL light system is considered by humans to be a highly theoretical solution but may not violate equations. Einstein field - the equation describing the spacetime structure and the distribution of objects on it.



Simulate how Warp Drive works.

Warp Drive achieves speed faster than light by stretching space-time in a wave, causing the space in front of it to shrink while the space behind it expands.

In theory, a spacecraft inside this wave would be able to achieve velocity beyond the speed of light, as illustrated by "Alcubierre figures" .

According to Einstein's theory of general relativity, the interior of this space-time bubble will form a separate inertial reference frame, separate from the outside. Because the spacecraft does not travel in space-time but only changes the space-time surrounding it, relatively common effects (such as time dilation) will not work.

In short, the Alcubierre engine allows to travel faster than the speed of light without **violating the laws of relativity** . Agnew told Universe Today via email, about his passion and inspiration for researching Warp Drive, ever since high school:

"I delved into mathematics and science, became interested in science fiction and advanced theories and applied it to practical engineering. I started watching Star Trek, and realized that the film was in attendance. guess or inspire the invention of mobile phones, tablets and other amenities.

I also thought more about some technologies, such as photon torpedoes, phasers (laser weapons) and warp engines, then tried to investigate whether science in Star Trek was feasible by contrasting with 'real world science'. Once I happened to find the original article by Miguel Alcubierre, after reading it for a while, I began to pursue the idea of ??this faster-than-light engine and went deeper into the theory very seriously. "

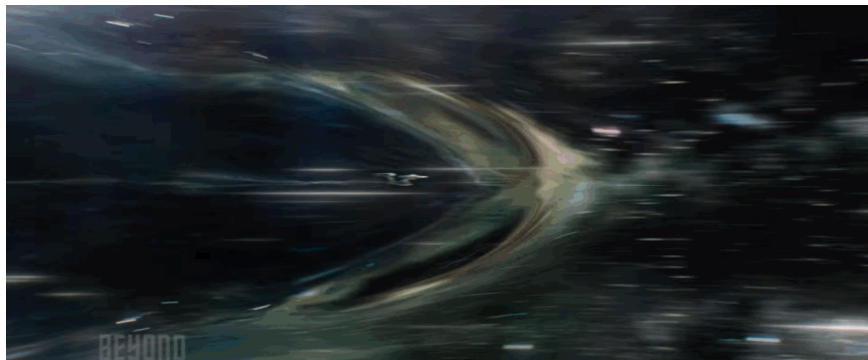


A "jump" of Faster Than Light.

Although this concept is often dismissed for theoretical and ideological purposes, it has been more interested in research in recent years, typically by Harold "Sonny" White, Head of the Force. Advanced push at the Advanced Dynamic Physics Laboratory - NASA Johnson Space Center (aka "*Eagleworks Laboratory*").

During the Symposium: '*100 years of space ship*' in 2011, Mr. White shared some calculations after the update of the Alcubierre engine, the subject of the presentation titled "*Warp Field Mechanical 101*".

According to Mr. White, Alcubierre's theory sounds plausible but needs some experimentation to develop more seriously. Since then, he and his colleagues have conducted intensive studies at Eagleworks Laboratories.



Warp Drive motor on the move will do no - time deformation.

Similar to Mr. White, Mr. Agnew spent much of his academic career studying the theory and mechanics behind this idea. Agnew's work has reached its peak, helping to solve difficulties and opening up great opportunities for the feasibility of the Warp Drive engine. Agnew's sponsor is Professor Jason Cassibry, a specialist in aerospace mechanical engineering, and a lecturer at the Dynamical Research Center of UAH.

But Agnew said: The concept of the engine faster than light has not been seriously considered by scientists.

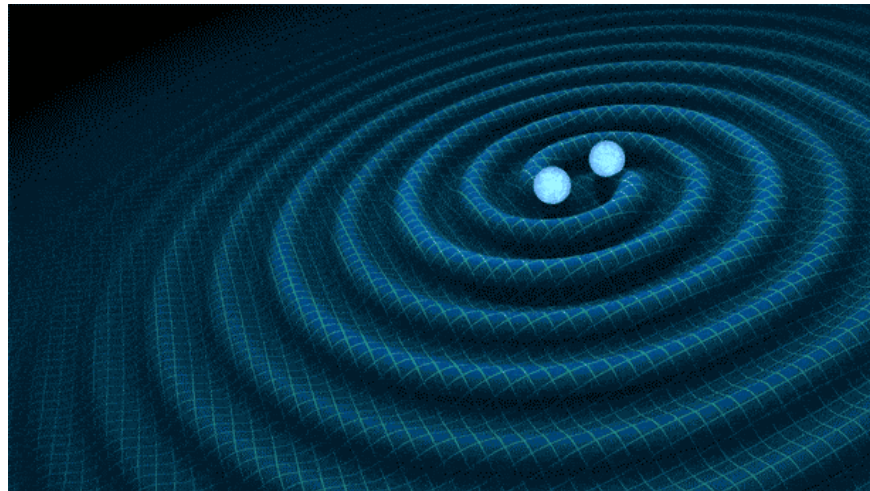
"In my experience, the mention of the warp engine tends to bring laughter to the conversation because it is too theoretical and full of science fiction. In fact, it is often dismissed as soon as discussion and will be used to give an example of something very odd."

In fact, I initially considered it to be the same type as other typical ultrasonic motion concepts, because all of them clearly violated the 'assumption that the speed of light is the maximum speed'.

It wasn't until I went into the theory more carefully that I realized it didn't have these problems. "

While the Warp Drive field is still in its infancy, there have been some scientific works that seem to support its feasibility.

For example, the discovery of gravitational waves in 2016 proved that Einstein's prediction from a century ago was accurate, indirectly confirming **the basic elements that formed the warp engine model. in nature .**



Two neutron stars orbiting each other to create gravitational waves.

Agnew commented: this is probably the most important development, but not the only one.

"Over the past 5-10 years, a lot of progress has been made in predicting the existence of warp engines, reinforcing assumptions and basic concepts, I personally love this, and I'm working on it. how to test theory in the lab

LIGO's discovery a few years ago, in my opinion, was a major step forward in science, because it proved that spacetime could 'warp' and bend in the presence of massive gravitational fields, which is spread throughout the universe in a way that we can measure. "

Because the Warp Drive system relies on space expansion and compression, the discovery of gravitational waves has demonstrated that some of these effects can occur naturally in the universe.

"Now we know the warp engine model in nature is real, and the next question, in my mind, is: how do we study it and we can create it in the room? experiment or not? ", he added. "Obviously, pursuing the idea of ??a faster engine than light is a tremendous investment of time and resources, but it will bring unpredictable benefits."

Of course, the Warp Drive concept requires a lot of additional research and progress before it can be tested, perhaps we need to wait for further development of science and technology.

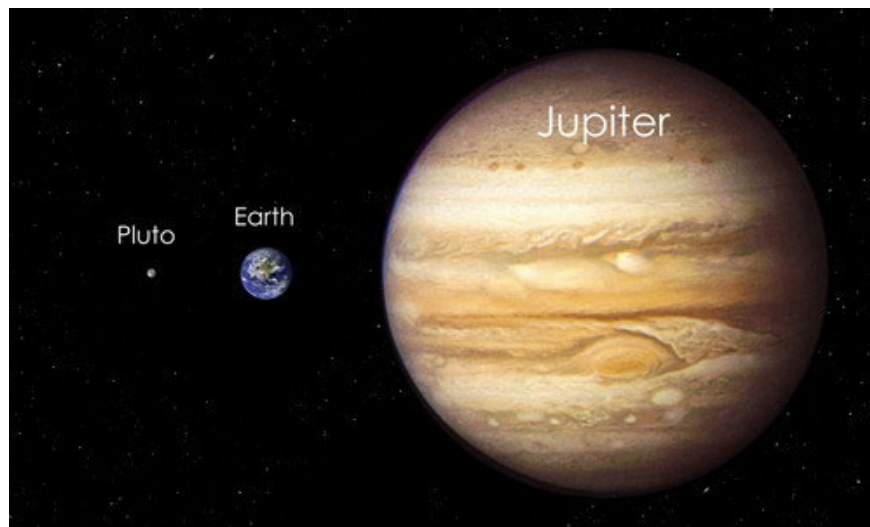
"In essence, what is needed for Warp Drive is a system that can expand and adjust space at will, around a small object or spacecraft. We know that electromagnetic fields or mass can bend in time and space, but with current

analysis it will take huge energy densities to do that.

I believe that if this effect could be reproduced on a laboratory scale, it would lead to a much deeper understanding of how gravity works and could open up some new theories or The hole has not been discovered.

However, the biggest obstacle is still energy, accompanied by technological barriers, so it is necessary to develop more sensitive devices and wait for progress in the field related to the electromagnetic field, etc. "

The amount of positive and negative energy needed to create a Warp Drive remains the biggest challenge related to Alcubierre's hypothesis. Currently, scientists believe that the only way to maintain the sound energy density needed to create 'bubbles' is through exotic matter. - things that are different from matter and we still know. It is estimated that the total energy demand for the system to operate will be equivalent to the mass of Jupiter.



Jupiter is the largest planet in the Solar System.

However, this also represents a significant decrease compared to previous estimates, when scientists thought that the Alcubierre engine would need an energy equivalent to the entire Universe. But the vast amount of strange matter the size of Jupiter is still too large, so further studies are needed to reduce the energy level to a more realistic number.

The only way to look forward to this is through advances in quantum physics, quantum mechanics and metamaterials, Agnew said. In addition to creating superconductors, interferometers and magnetic transmitters is also essential to gradually realize the idea of ??the engine faster than light. And of course, the issue of funding is always a small challenge when it comes to concepts far from reality.

But Agnew says this is not an impossible challenge. If we look at the scientific and technological advances made to date, we have absolutely good reason to believe in the future:

"Theories put forward so far are worth pursuing, with the evidence justified to make subsequent research easier. It's not hard to realize that the exploration of the universe goes beyond the System. the sun, even beyond our own galaxy, will be a leap forward for humanity, and the development of technologies that go beyond the limits of current science will certainly help. "

Like avionics, nuclear research, space exploration, electric cars and reusable boosters, Alcubierre Warp Drive seems to be one of the concepts that humanity will have to look into. future.