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Another Collimation Mechanism of Astrophysical Jet

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Abstract: The acceleration mechanism of astrophysical jet and the collimation mechanism narrowing down to a long distance have been examined so far. It is a collimation problem of how to narrow the astrophysical jet narrowly. Further, the model of the astrophysical jet acceleration mechanism is required to solve this collimation problem at the same time as well as its acceleration. At the present time, the magnetic force model (magnetic centrifugal force and magnetic pressure) is regarded as the most dominant theory which solves the two problems of astrophysical jet acceleration and collimation at the same time. In addition to the present astrophysical jet narrow collimation mechanism by magnetic tension (pinch) force, in this article, another collimation mechanism which narrows down an astrophysical jet is newly introduced. That is, since a curvature is generated in the space around the astrophysical jet by magnetic field, a kind of pressure equivalent to the gravitational effect is generated in the direction of the interior of astrophysical jet as well as the pinch force from the outer circumferential surface of the astrophysical jet.

Key words: Astrophysical jet, accretion disk, black hole, collimation mechanism, acceleration mechanism, magnetic field, continuum, curvature, space-time, cosmology.

1. Introduction

The astrophysical jet is a narrow jetted plasma jet at high speed (100 km/s to near the speed of light) that emits in both directions vertically from accretion disk around the compact central object such as a neutron star or black hole. Its length is an enormous, long and narrow jet reaching from 1 light year—10 light years—1 million light years. A jet propagating at a speed close to the speed of light is called a relativistic jet.

The acceleration mechanism of the astrophysical jet and the collimation mechanism narrowing down to a long distance have been examined so far. They are due to thermal gas pressure, light radiation pressure, and magnetic field pressure. Currently, Radiative Acceleration model accelerated by the radiation field of the accretion disk and Magnetic Acceleration model accelerated by magnetic field penetrating the accretion disk are representative models. The high velocity, highly collimated gas streams—jets—raise two major problems, namely how the jet material is accelerated, and how it is collimated (Fig. 1a).

It is a collimation problem of how to narrow the jet narrowly, and the model of the jet acceleration mechanism is required to solve this collimation problem at the same time as well as acceleration. At the present time, the magnetic force model (magnetic centrifugal force and magnetic pressure) is regarded as the most dominant theory which solves the two problems of jet acceleration and collimation at the same time. That is, the accretion disk generates a helical magnetic field by twisting the magnetic field lines, accelerates by magnetic force, and narrows the jet by magnetic tension (pinch). The self-pinching force of magnetic field twisted by the rotation occurs naturally as a force to collimate the jet thinly (Fig. 1b) [1-8].

However, there are also controversies among researchers as follows: 1) the global magnetic field cannot be MHD (magnetohydrodynamic) jet due to

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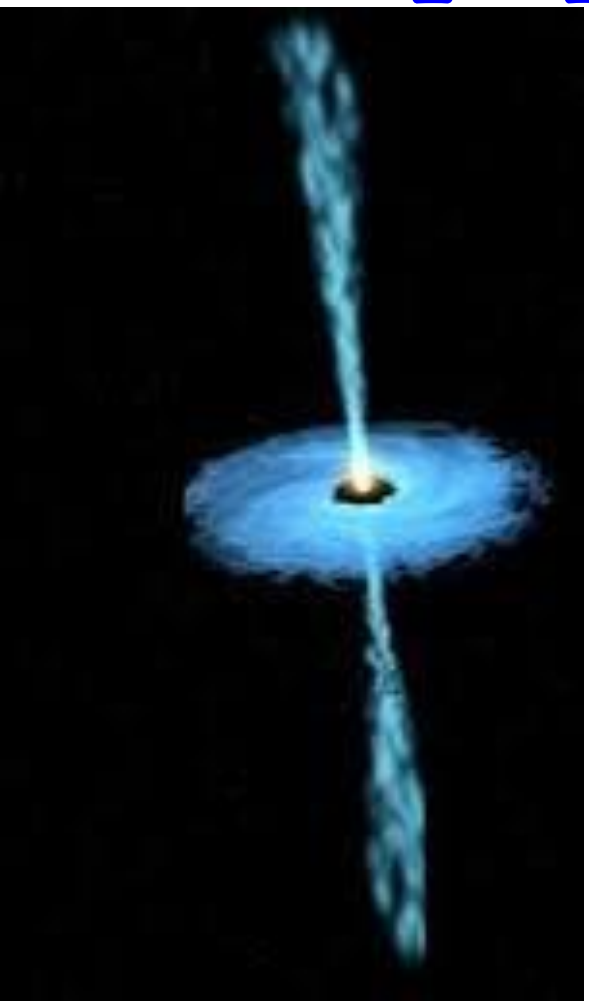

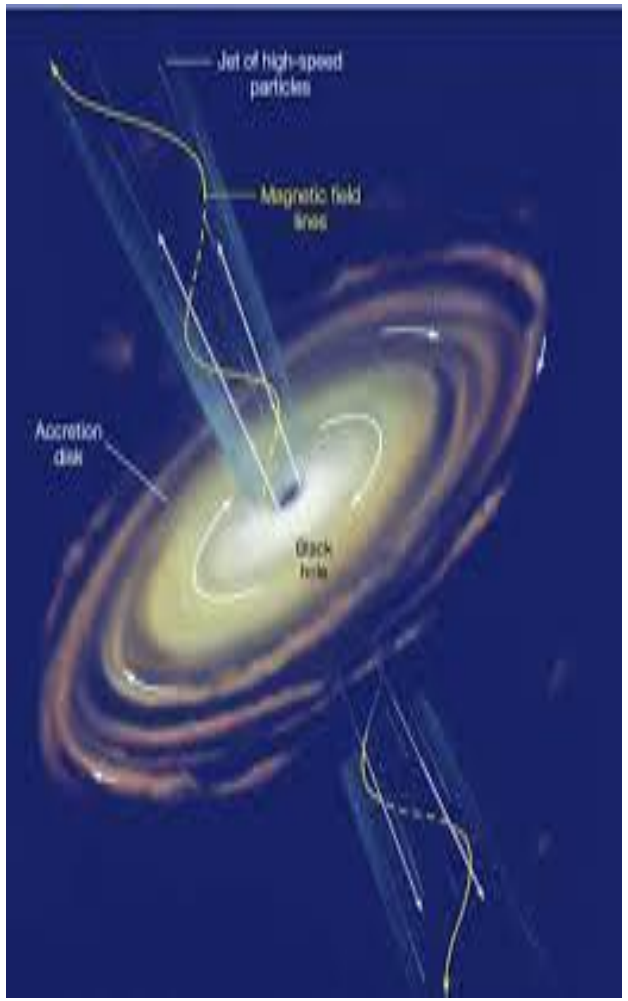

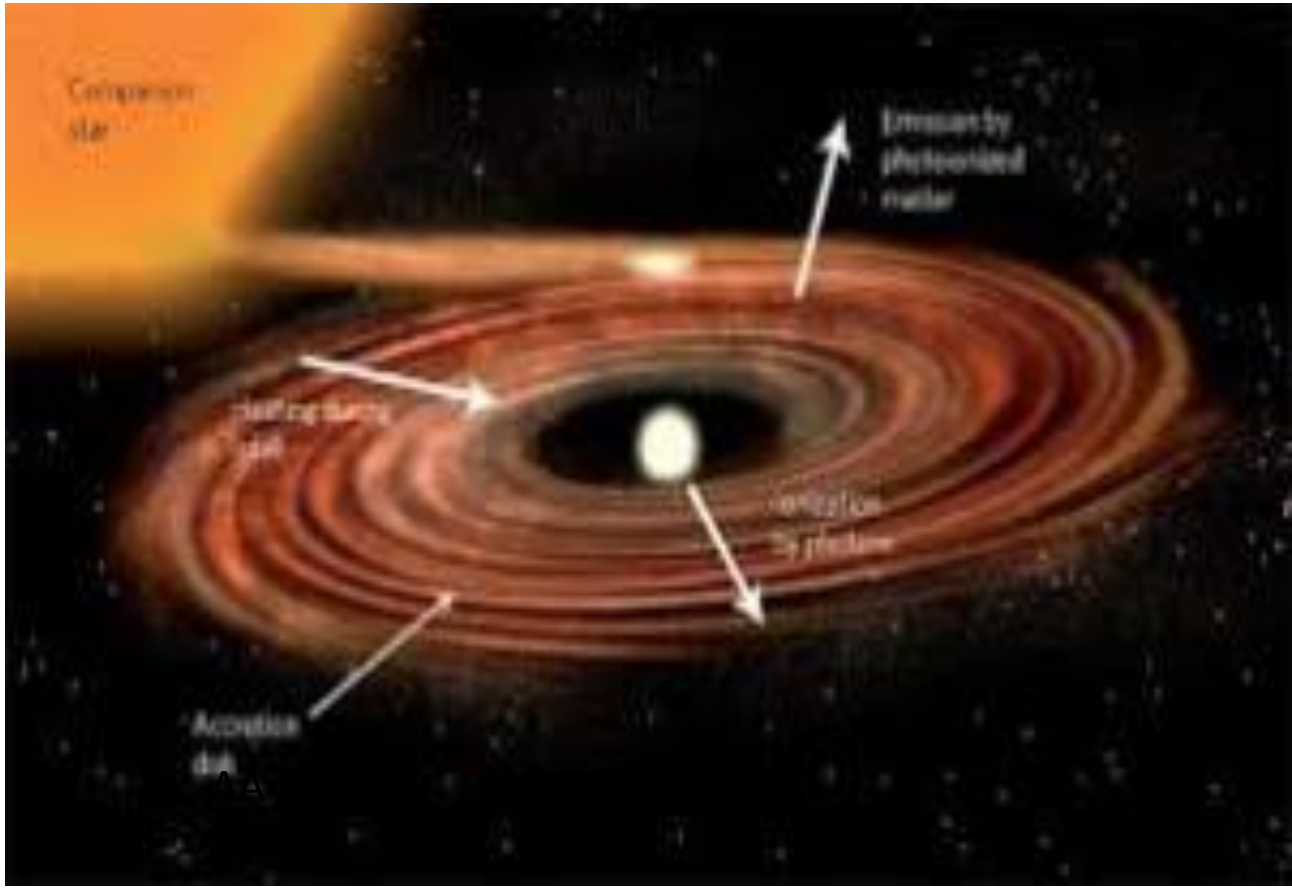

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Interstellar Travel by Hyper-Space Navigation System

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Abstract

An interstellar travel within a human lifetime is considered as utterly impossible. The interstellar travel used Special Relativity is well known. However, there exists the problem of the twin or time paradox. In addition, although space warp using wormhole is also well known, the size of the wormhole is smaller than the atom, and moreover, the wormhole is predicted to fluctuate theoretically due to instabilities. Assuming Hyper-Space as being characterized by imaginary time, it is shown that the limitations due to the extremely long time required for interstellar travel are removed. The Hyper-Space navigation theory discussed here would allow a starship to start at any time and from any place for an interstellar travel to the farthest star systems, the whole mission time being within human lifetime.

This newly added paper introduces a realistic method of the interstellar travel (i.e., Hyper-Space navigation) based on the concept published so far by author [1-6].

Keywords

Interstellar travel, Space-time, Imaginary time, Hyper-Space, Wormhole, Special Relativity, Time-hole

Introduction

As is well known in astronomy, sixty-three stellar systems and other eight hundred fourteen stellar systems exist respectively within the range of 18 and 50 light years from our Solar System. For instance, Alpha Centauri is the nearest star from Earth, and the star Sirius, which is the seventh nearest star, is 8.7 light years from Earth, while the Pleiades star cluster is 410 light years from us. According to Einstein's Special Relativity, sending a starship to a stellar system at a distance longer than several hundred light years would ask for an extremely long time even if the starship would travel at the speed of light. For instance, assuming that the starship is traveling to the Pleiades star cluster at a speed of 0.99999c, it will arrive at the Pleiades 1.8 years later and, in the case of immediately starting of the return travel, it would be back to Earth 3.6 years after leaving for the Pleiades. But this would be just for the clocks of the astronauts onboard the starship for that mission. For people on Earth, the whole time period would be 820 years, with paradoxical consequences as to the feasibility of a mission such as this. The first solution of the above-stated problem is to obtain a breakthrough in propulsion science. However, from the standpoint of propulsion theory using not only momentum thrust but also pressure thrust, there is no propulsion theory which exceeds the speed of light, even if we use the field propulsion theory. Accordingly, the propulsion theory alone is not enough to establish the reality of interstellar travel, thereby requiring a navigation theory as a secondary solution.

Concerning interstellar travel, the method using a wormhole is well known; relying on space warps, such as for instance Wheeler-Planck Wormholes, Kerr metric, Schwartzschild metric, Morris-Thorne Field-Supported Wormhole based on the solutions of equations of General Relativity [7]. However, since the size of wormhole is smaller than the atom (10^{-10}m), i.e., ~10^{-35} m and moreover the size is predicted to fluctuate theoretically due to

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Due to the lack of space propulsion technology and space navigation technology that can accelerate at high speed in a short time, it is well known that mankind does not currently have technology to realize a journey to the star system.

This book explains the galaxy exploration by combining the field propulsion based on the physical structure of space-time and new navigation theory.

From the physical and engineering point of view, the propulsion principle and propulsion theory of field propulsion are explained. As a typical example of field propulsion, space drive propulsion system including its theory, registered patent, the latest development from the viewpoint of cosmology and astrophysics are also discussed.

Next, for galaxy exploration, navigation technology such as a wormhole that bypasses the wall of light speed is indispensable. A method for overcoming the "light barrier" (the seeming "wall-of-light" in 4-D space-time), that is, a hyperspace navigation theory to "jump the light-barrier" is explained.

The reader will not only get a good introduction to the science and technology of field power and propulsion physics, but also to the possibility of interstellar navigation.

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Space Science, Exploration and Policies

Yoshinari Minami
Herman David Froning
Editors

Field Propulsion Physics and Intergalactic Exploration

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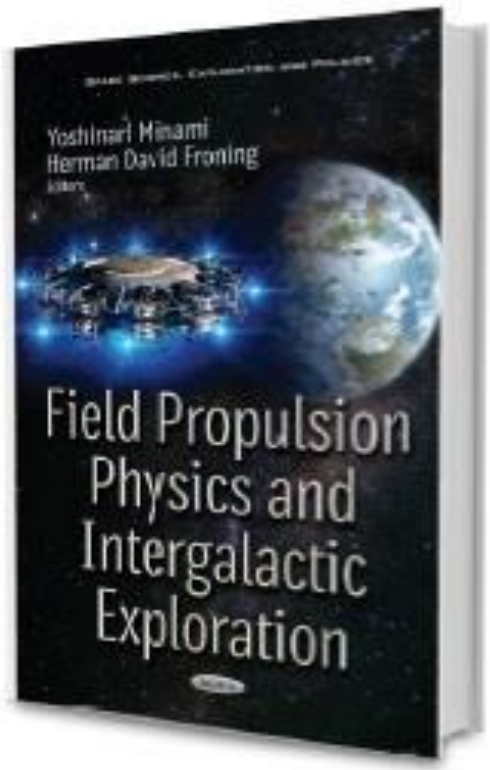

Book Description: Due to the lack of space propulsion technology and space navigation technology that can accelerate at high speeds in a short time, it is well-known that mankind does not currently have technology to realize a journey to other star systems. This book explains galaxy exploration by combining field propulsion based on the physical structure of space-time and a new navigation theory. A field propulsion system is propelled without mass expulsion. The propulsive force as a pressure thrust arises from the interaction of space-time around the spaceship itself; this causes the spaceship to propel against the space-time structure. Firstly, from the physical and engineering point of view, the propulsion principle and propulsion theory of field propulsion are explained. As a typical example of field propulsion, the space drive propulsion system includes its theory, the registered patent, and the latest development from the viewpoint of cosmology and astrophysics. Secondly, for galaxy exploration, navigation technology such as a wormhole that bypasses the wall of light speed, not propulsion technology, is indispensable. A method for overcoming the "light barrier" (the seeming "wall-of-light" in 4-D space-time), or a hyperspace navigation theory to "jump the light-barrier", is explained. Combining the space propulsion system and the navigation system makes it possible to perform a realistic galaxy exploration.

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Space drive propulsion device

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INT CL[5] **H02K 53/00 57/00,**
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updated as appropriate

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Fig. 3.

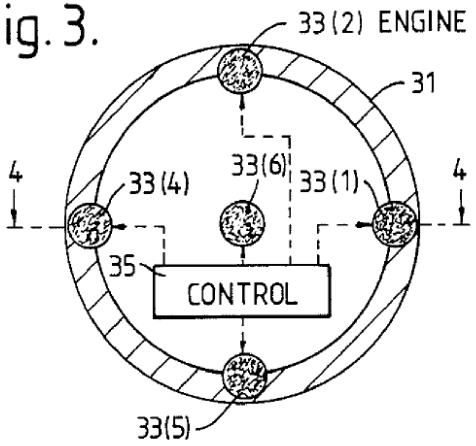
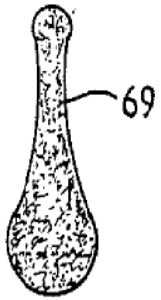
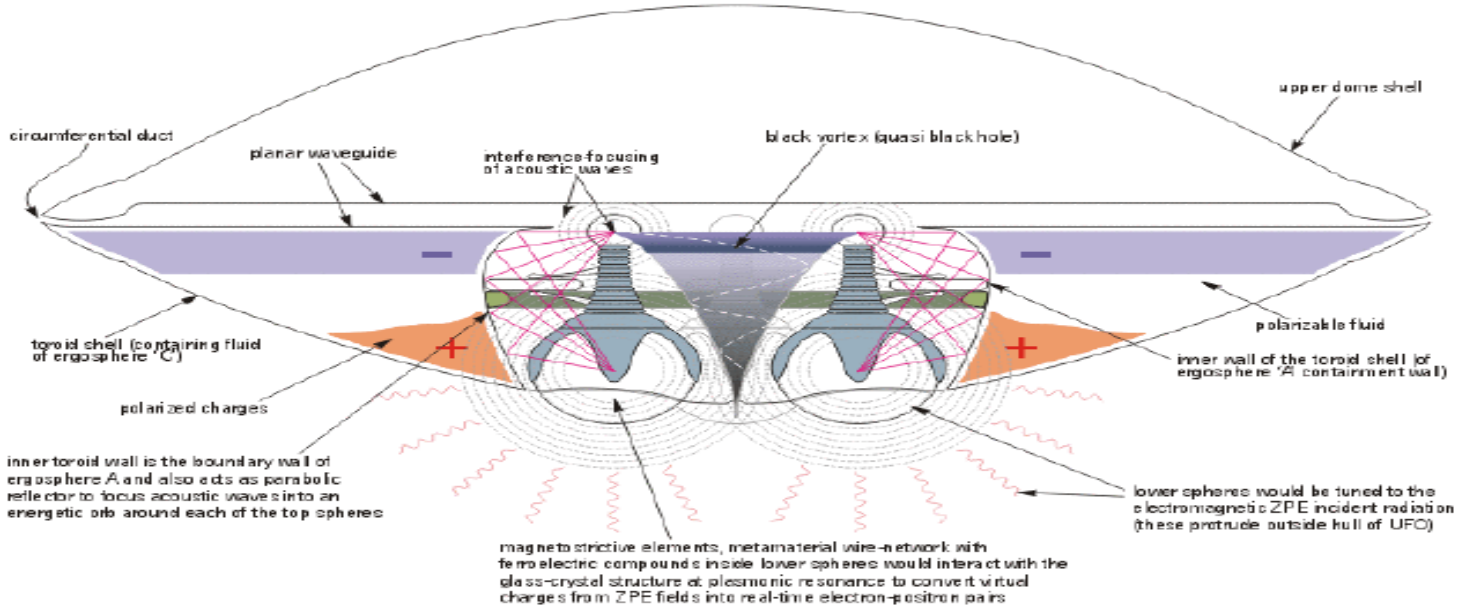
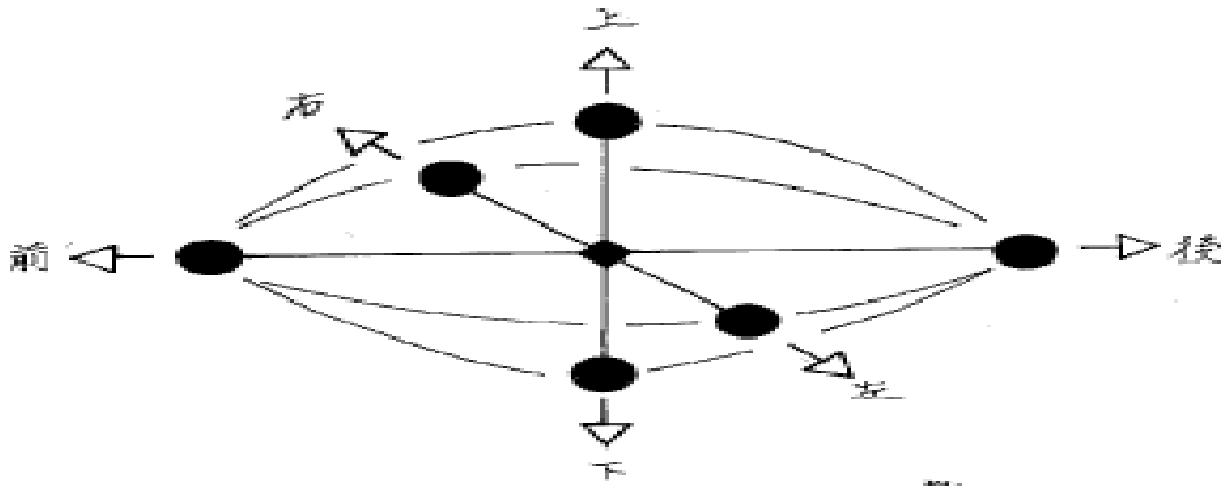


Fig. 17.



NECで出願(1991.12月24日)した日本特許(1999.6.11登録)、英国特許(1995.8.16登録)のエンジンの形状が同じなのに驚いた。





６基のエンジンにより全方向移動可能
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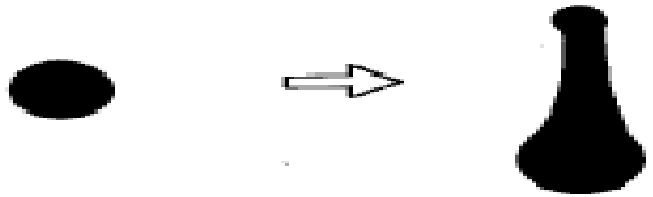

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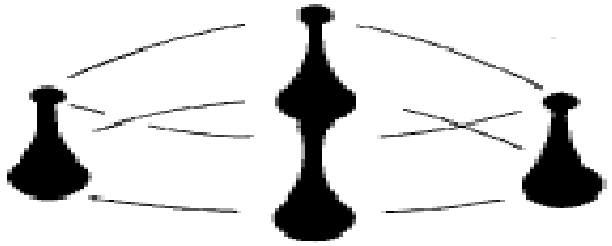
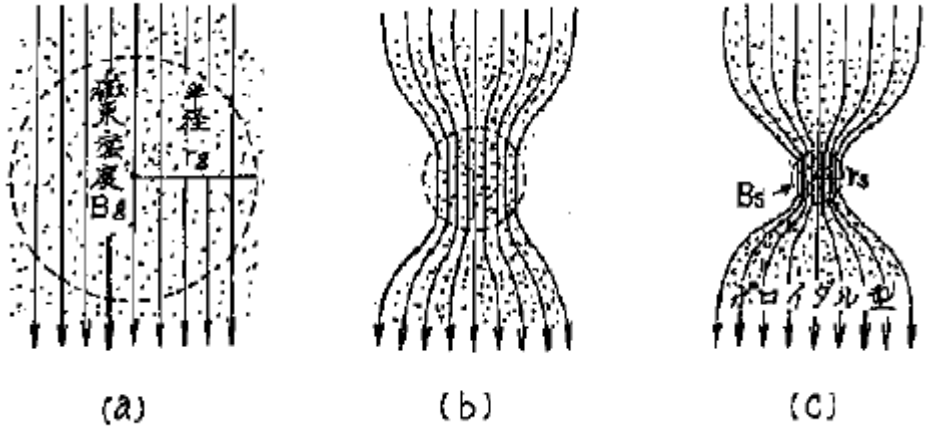
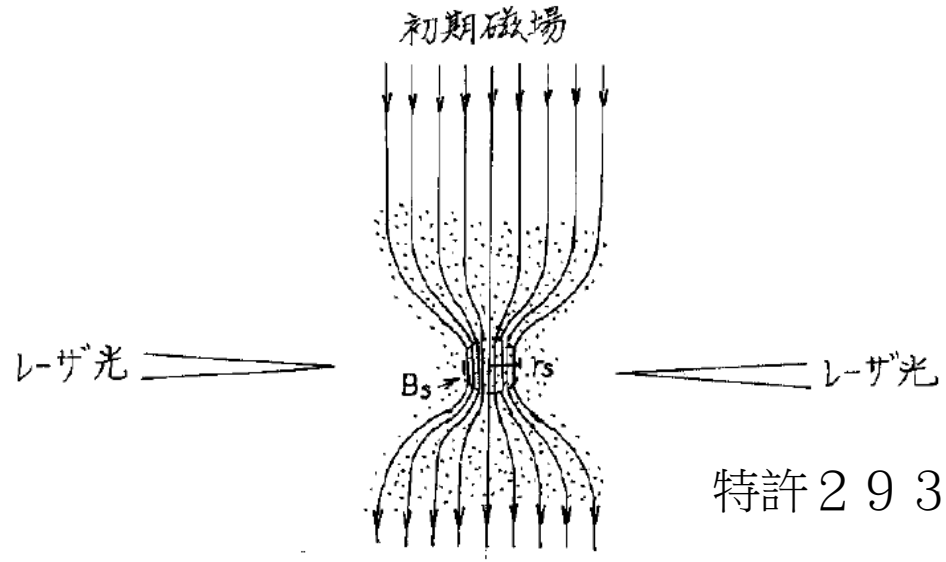


４基のエンジンにより全方向移動可能

特許２９３６８５８(1999.6.11)
UK Patent GB2262844B (1995.08.16)
Space drive propulsion device
Filing:1992.12.23
Application published:1993.6.30

【図１８】





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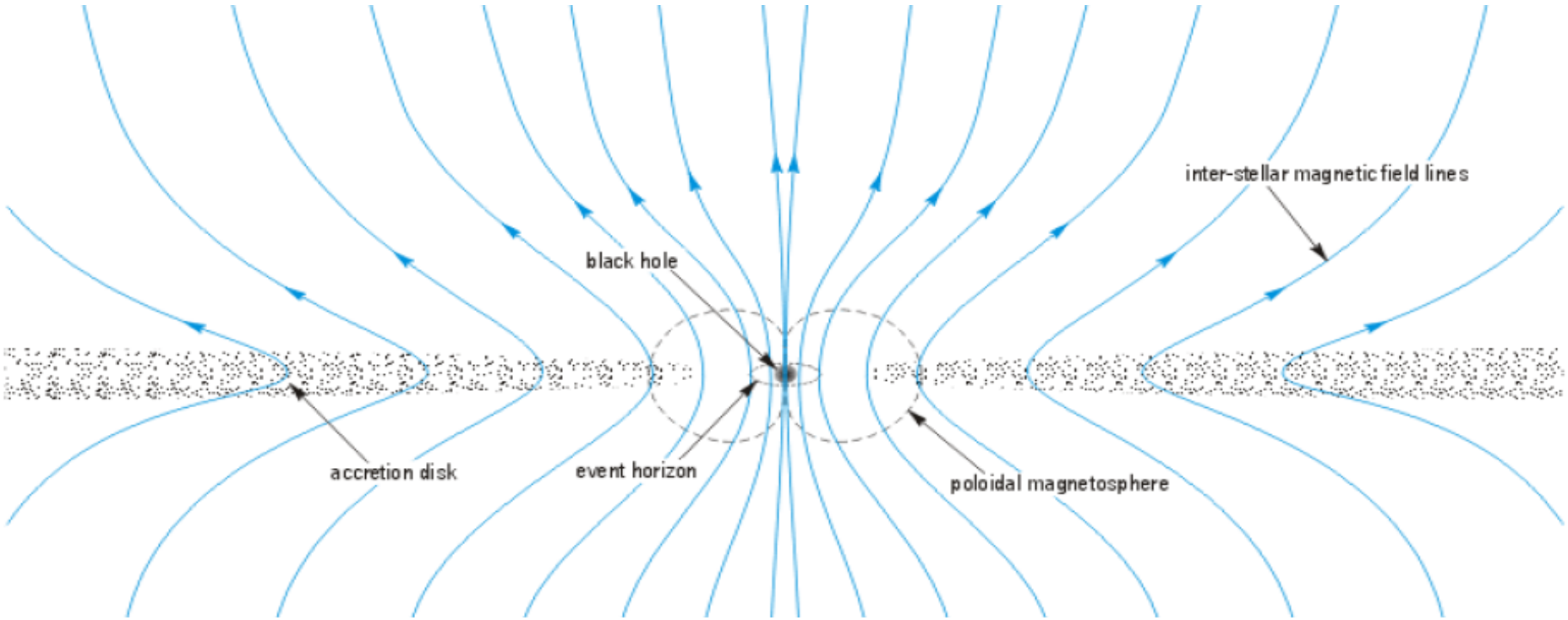

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Commentary Open Access

A Journey to the Stars: Space Propulsion Brought About by Astrophysical Phenomena Such as Accretion Disk and Astrophysical Jet

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Travel to the Space in 21st century

At the present stage of space propulsion technology, the only practical propulsion system is chemical propulsion system and electric propulsion system, which are based on expulsion of a mass to induce a momentum thrust. Since the maximum speed is limited by the product of the gas effective exhaust velocity and the natural logarithm of mass ratio, its speed is too slow for the spaceship to achieve the interplanetary travel and interstellar travel. Thus the breakthrough of

Space Propulsion Brought About by Astrophysical Phenomena

Here, astrophysical phenomena refer mainly accretion disk and astrophysical jet around black holes. Accretion disk is rotating gaseous disk with accretion flow, which form around gravitating object, such as white dwarfs, neutron stars, and black holes. At the present day, owing to the development of observational technology, it is believed that

SciFed Journal of Astrophysics

The Role of Magnetic Field in Astrophysics and Its Application

1. Application for Acceleration and Collimation Mechanism of Astrophysical Jet

2. Application for Gravitational Wave Generation

1989.4月講演、2016.5月Journal

3. Application for Space Propulsion System