

Use of fuel is impractical for space exploration propulsion. Fuel is by far the largest, most significant, weight component of rocket propulsion systems. The only fuel-free acceleration propulsion method for space exploration is controlled gravitation. That is the only means for a flying vehicle to explore a distant planet upon arrival there and the only means of getting to the distant planet so as to explore it.

The only solution to the problem of space travel propulsion is Control of Gravitation.

Such Control of Gravitation is the subject and purpose of this book.

THE PROBLEM

SECTION 1

Space Exploration Requires Control of Gravitation

The primary problem of space exploration, whether of Mars or Proxima Centauri, is that the distances are so immense.

They are so immense that they are measured in terms of the distance that light travels at its great speed, the greatest speed possible, for one full Earth year. It is for that reason that we are interested in Alpha Centauri. It is the closest star system to us at 4.37 light-years from our Sun; its distance is the least overwhelming of the myriad other cosmic distances. In addition it has the closest ever detected planetary system.

Alpha Centauri is named for the constellation of stars that is named for the Centaur of Greek mythology [upper body of a man with lower body of a horse], and Alpha for the brightest point in that constellation. It consists of three stars: Alpha Centauri A, B, and C. Alpha Centauri A and B are stars similar to our Sun in a binary pair rotating about a common center and for them we have no detected planets in the habitable zone.

Though not visible to the naked eye, Alpha Centauri C [also called Proxima Centauri], a small faint red dwarf about 0.2 light-years from the A-B binary pair is the closest star to our Sun at a distance of 4.24 light-years.

Only one planet has been confirmed for Proxima Centauri, Proxima Centauri b. That planet is slightly larger than the Earth and orbits around Proxima Centauri in the habitable zone.

And, perhaps, that planet's resemblance to our Earth is why we are interested in How to Travel to Alpha Centauri

PROBLEMS SUMMARY

For travel to Alpha Centauri there are two major problems:

[1] Because of the distance it will take over 4 years to get there. The vehicle must support the crew with food, water, elimination of waste, breathable air, medical services, electric power, *etc.* without any support from Earth for at least 9+ years for the round trip. Thus the vehicle must be massive.

[2] That massive ship must be accelerated and decelerated throughout the trip without use of fuel. Rockets consume far too much fuel and solar sails are far too inflexible and inefficient. The only fuel-free acceleration is by gravitation.

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Just as the sail-driven ships of past centuries explored the world with fuel-free travel by controlled use of wind, a new gravitation technology enables fuel-free exploration of space by control of the ubiquitous gravitational field.

THE PROBLEM OF UNDERSTANDING GRAVITATION

Contemporary science has completely failed to comprehend the cause of gravitation, its mechanism, how it works. Einstein became the “hero” of gravitation because of his General Theory of Relativity and the success that it has had in describing and predicting the behavior of gravitation and the various effects that gravitation produces.

But, none of that addresses the mechanism causing the action of gravitation. The closest that Einstein’s General Relativity comes to presenting a mechanism of gravitation is its contention that gravitational mass bends or distorts space and that the resulting non-linearity produces the gravitational effects.

However, Einstein’s General Relativity offers no explanation of how, why, by what mechanism gravitational mass bends space; nor does it offer any explanation of what space is and how it is susceptible to bending.

The famous Eddington experiment in which the deflection of light by the gravitational field of the Sun was successfully measured was taken as comprehensive proof of Einstein’s General Relativity even though it included no understanding of the cause, the mechanism of gravitation.

And, the failure to even have an interest in investigating further into gravitation to seek to achieve an understanding not merely of what gravitation does but, significantly further, how and why it does what it does remains to the present day as a giant impediment to coming to understand gravitation and to turning it to useful application for mankind.

THE TASK AHEAD

In view of the foregoing, that is:

- The necessary massiveness of a vehicle for humans to travel deep space distances requires a controlled gravitational acceleration propulsion system,

and

- The absence of scientific research into the nature, mechanism, and cause of gravitation, let alone research into means of controlling gravitation,

combined leave open the way for development of control of gravitation based upon scientifically developed understanding of how and why gravitation operates.

That develops as follows.

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Experience shows that everything has a cause and that those causes are themselves the results of precedent causes, *ad infinitum*. Defining and comprehending the causality or mechanism operating to produce an observed behavior is essential to understanding or explaining it.

The comprehensive explanation of the cause and mechanism of gravitation as derived from the origin of the universe is the Modern Newtonian Model of Gravitation. Its development consists of the following steps all thoroughly treated in the following sections.

First Steps – The Nature of Gravitation

The development of the Modern Newtonian Model of Gravitation consists of the following steps. Each step results in new “hard” facts generated directly from prior “hard” facts. The development does not contain nor rely on opinions. Consequently, while it is deemed a “model” it is an exact factual description of what it treats.

- 1 – How the universe’s particles of matter came into existence.
- 2 – How they came to be propagating an oscillatory outward flow.
- 3 – The reservoir supply for the substance of the outward flow.
- 4 – The speed of the outward flow.
- 5 – A particle’s flow encountering another particle slows its outward flow.
- 6 – The outward flow has momentum.
- 7 – Gravitation is the momentum reaction to outward flow slowing.

Then, given the nature and mechanism of gravitation, the development of the management and control of gravitation and the development of specific applications of that control proceeds as follows.

Second Steps – The Control of Gravitation

- 1 – Deflection of light – slowing of its flow.
- 2 – Light and gravitation are different aspects of the same matter particle flow.
- 3 – Slit diffraction of light’s flow is diffraction of gravitation’s flow.
- 4 – A gravitation deflector.
- 5 – The amount of the deflection.
- 6 – The mechanism of gravitational repulsion, anti-gravity.
- 7 – Gravitation deflection spacecraft and flying vehicles.

<p>Next: the development of the nature of gravitation from how the universe came into be</p>
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