Chapter 5
About Gravitational (Inertial) Motors

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ABSTRACT

A gravitational motor interact with the locally gravitational field in order to produce a linear and/or rotational thrust able to move in space a given vehicle. The big advantages of such a motor are the facts that it can be used for nearly any kind of vehicle, even in free space, and may be placed inside the vehicle as the necessary interactions with the environment are realized through gravitational fields but not by direct mechanical interaction as for actual motors used for vehicles. Generally, in mechanics a physical motor may be considered as a 'transducer' between some input (equivalent) energy existing on a vehicle and the output (equivalent) obtained movement of this vehicle. For space treks, such a motor must be able to ensure the take-off and/or landing of a space vehicle on any given planet and carry the entire load corresponding to this vehicle including also the necessary energy sources and eventually a human crew. By analogy with the Levitron toy the atomic particles, and the maglev such motor may be built. The paper presents some ideas and mathematical models that may help to build such a gravitational motor. It starts by presenting the energy based differential equations that have as solution analytic complex exponential functions, elliptic and ultra-elliptic functions adding also a physical interpretation of their coefficients. Forces and torques in mechanic and electro mechanic are presented and also methods to obtain such forces using only torques. Based on the modified Euler equations of a gyroscope with an added magnet like for the Levitron toy, an electro-mechanical gravitational motor may be built and a mathematical model for the gravitational waves is also deduced. Maybe, by using this kind of waves, a permanent contact between an interplanetary ship and the earth can be kept. Another kind of inertial motor may be based on the direct transfer of the energy of acoustical and/or ultra-acoustical waves that represents the desired 'inertia' of a vehicle to this vehicle. This kind of transfer may be realized using convenient acoustical and/or ultra-acoustical 3-D sources. This last method has the advantage that uses no mechanical component in movement and then may lead to a better reliability. Associated with a good and convenient technology that may be developed on the presented bases, all these tools are of most strategic importance. Applications may be found in interplanetary telecommunications and treks but also for a new, more sure and versatile, telecommunications systems and terrestrial vehicles. The presented tools may be used for mathematically modeling the fields and ensure also a more comprehensive understanding.

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INTRODUCTION

In nature, any 'change' correspond to an interaction that implies an exchange of energy and/or its equivalent, the mass. Then, any 'change' may lead to a 'transformation'. It is known that the energy (and/or action) based differential equations established relations between the items that interact and have as solution degenerate elliptic (complex exponential), elliptic and/or ultra-elliptic functions. All these functions are periodic having real and imaginary periods. Physically, the real periods may represent the 'time interval of the given transformation' and/or also 'it's dynamic' and the imaginary periods may have other significations too. As an example, for the complex exponential functions, the imaginary period is connected to the 'damping' of a given system. The time integral of the exchanged energy during the (real) period of such function correspond to a '(realized) action'. We remember that Kaluza-Klein theory (Wikipedia, Kaluza-Klein, 2016) in 5 dimensions use the action and the variation principle to unify the Einstein and Maxell theory. It is known that the analytic functions must satisfy the Cauchy-Riemann equations:

$$\begin{cases} \dfrac{\partial u[x,y]}{\partial x} = \dfrac{\partial v[x,y]}{\partial y}; \\ \dfrac{\partial v[x,y]}{\partial x} = -\dfrac{\partial u[x,y]}{\partial y}; \end{cases} \tag{1}$$

which represents the 'condition of analyticity'. These relations are some kind of 'symmetries' of the analytic functions. From Noether's theorem (Wikipedia, Noether theorem, 2016), it results that the waves and/or gravitational fields that may be modeled by these functions conserve their energy. This is in accord to the fact that light may come from very far away stars and also that on earth, the energy used to lift vertically a given mass with 1 meter is equal to the energy obtained when this mass return to its initial position. Similarly, a celestial corps (and/or a human satellite or probe) may inertial move very long time without the need of any motor.

A transformed item may remain inside its initial domain and/or may be transferred to another domain. In this last case the transformation is generally realized through a 'transducer'. Many motors may be considered as 'transducers'. As a well-known example, an electric motor 'transfers' the input electrical energy into the output mechanical rotation energy. Generally, the mass is a good transducer to the gravitational fields and also for the electromagnetic fields as for some structures like aerials. One remark that the atomic particles as electron, positron, proton, may be assimilated to a Levitron toy (Wikipedia, Levitron, 2016), because they have spin and magnetic moment. More, they 'wobble' like a gyroscope through electron spin resonance (Wikipedia, EPR, 2016), and/or nuclear magnetic resonance (Wikipedia, NMR, 2012) effects as example. From here it results that in some cases, the 'action-reaction' Newton principle may not take place always in the 'input' domain of a transducer (Wikipedia, Reactionless drive, 2016). Generally, any 'transformation' needs energy and/or mass transfer and also time. Then, a motor cannot instantly transfer to his vehicle the necessary energy to move in a given desired direction even if it is very powerful. Anyhow, the motor transfer energy to the 'inertia' of the vehicle and in time, these transferred energy must compensate the losses and ensure the necessary energy for the vehicle to follow the desired trajectory. We may observe that the inertia of a given mass may be equivalent to a kind of 'polarization' of the mass of vehicle and that in some conditions as free space and/or on an ideal horizontal way (nearly) without frictions on earth, a vehicle may follow its way without the need