Trigonometric Approximation of the Three-Body Problem: A Double Centroid Approach

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Abstract

This manuscript introduces the Double Centroid Approximation, a trigonometric method to simplify the Three-body problem in celestial mechanics. By calculating the centroid of three celestial bodies without and then with motion, it offers a novel approach to determine their dynamic center of mass. Grounded in the Superconducting Field Theory, this method simplifies complex gravitational interactions and dark matter considerations. While applicable within our solar system, its principles may extend to other galaxies, highlighting the potential for broad astronomical applications. This concise methodology underscores the importance of triangulation in understanding celestial mechanics, providing a foundation for future research in the field.

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1. Introduction

The Double Centroid Approximation is a Three-body problem approximation via trigonometry. It tries to explain the generation phases to explain the Three-body problem from scratch. Taking the initial positions and velocities of 3-point masses, and solving their subsequent motion according to Newton's laws of motion.

From 3 stopped bodies, we can figure out how to get their center of mass, adding motion subsequently and calculating their new center of mass. This is an approximation, so I'm going to do it 100% trigonometrically, which is much easier and more intuitive **(the first calculation has a deviation in the Lagrange points that is not too big in our solar system and which can be adjusted for all places in the universe, is just the example of how it could work).** It's based on my first theory (Superconducting Field Theory, 2024) [1], which depends on gravitational differences, **mostly calculations for dark matter**.

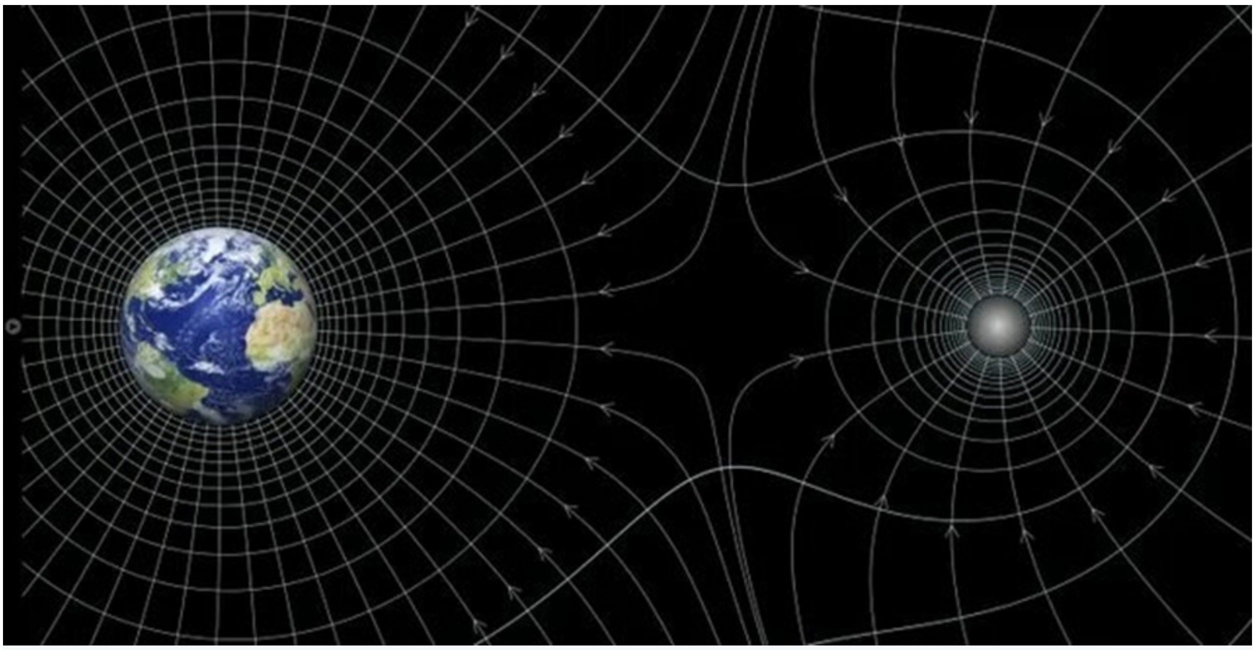

Fig. 1. Lagrangian model

2. Calculate the center of gravity of 3 bodies in space (Lagrange points) without taking into account their motion

First, quantify each center of mass **between each individual pair** (using two bodies) just by trigonometry. After that, with each point calculated, try to calculate its centroid; it should be its center of mass with no motion.

With every 2 bodies calculate its center; then the common center.

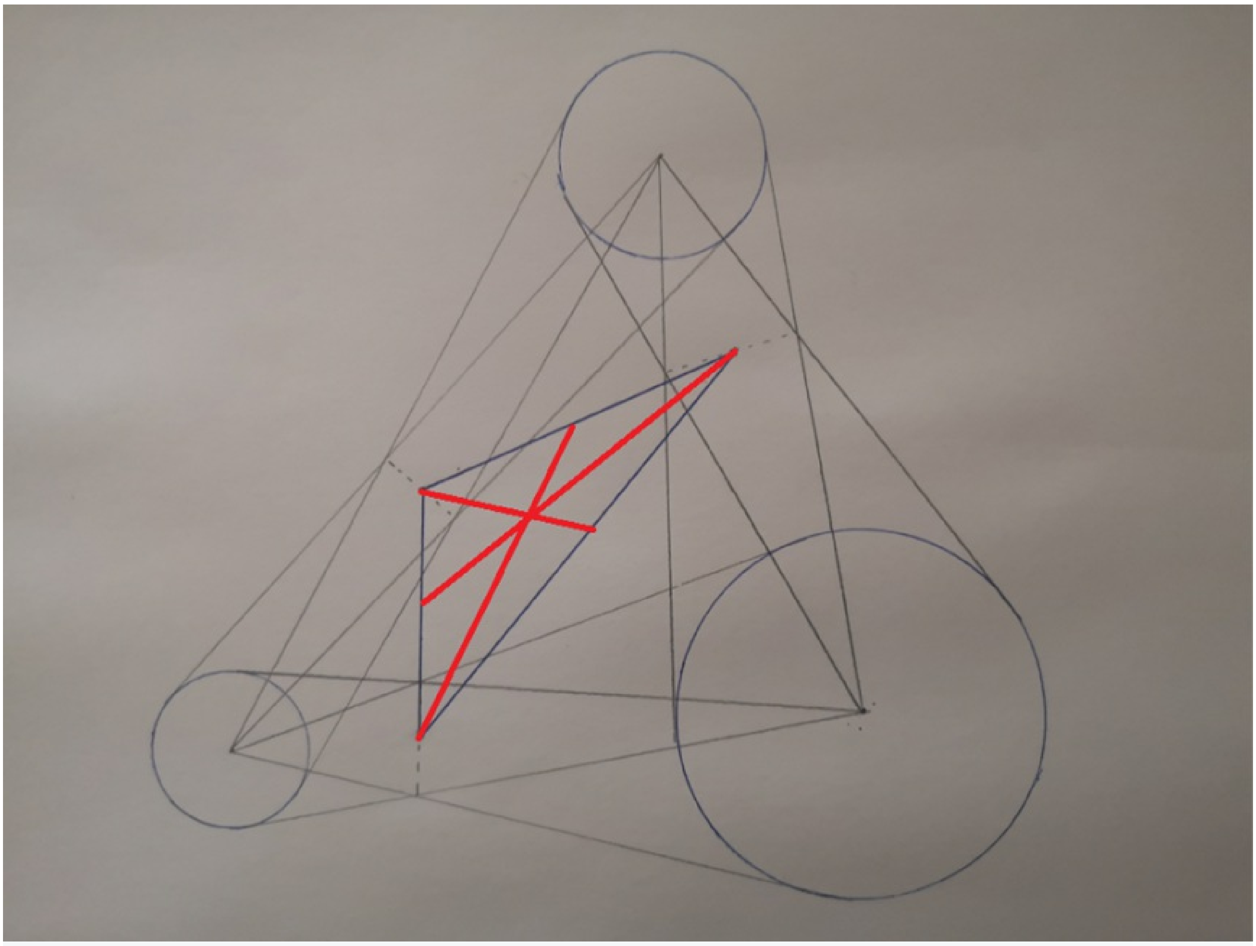

Fig. 2. First centroid

3. Add motion; bodies will rotate at a direction and speed known

With the point calculated at **point 1**, calculate the average centripetal force for each body (considering its speed and direction) and add it to its individual Newtonian vector from the center calculated (it should show how motion transforms its gravitational vector).

The center of mass of each body is displaced outwards by the motion.

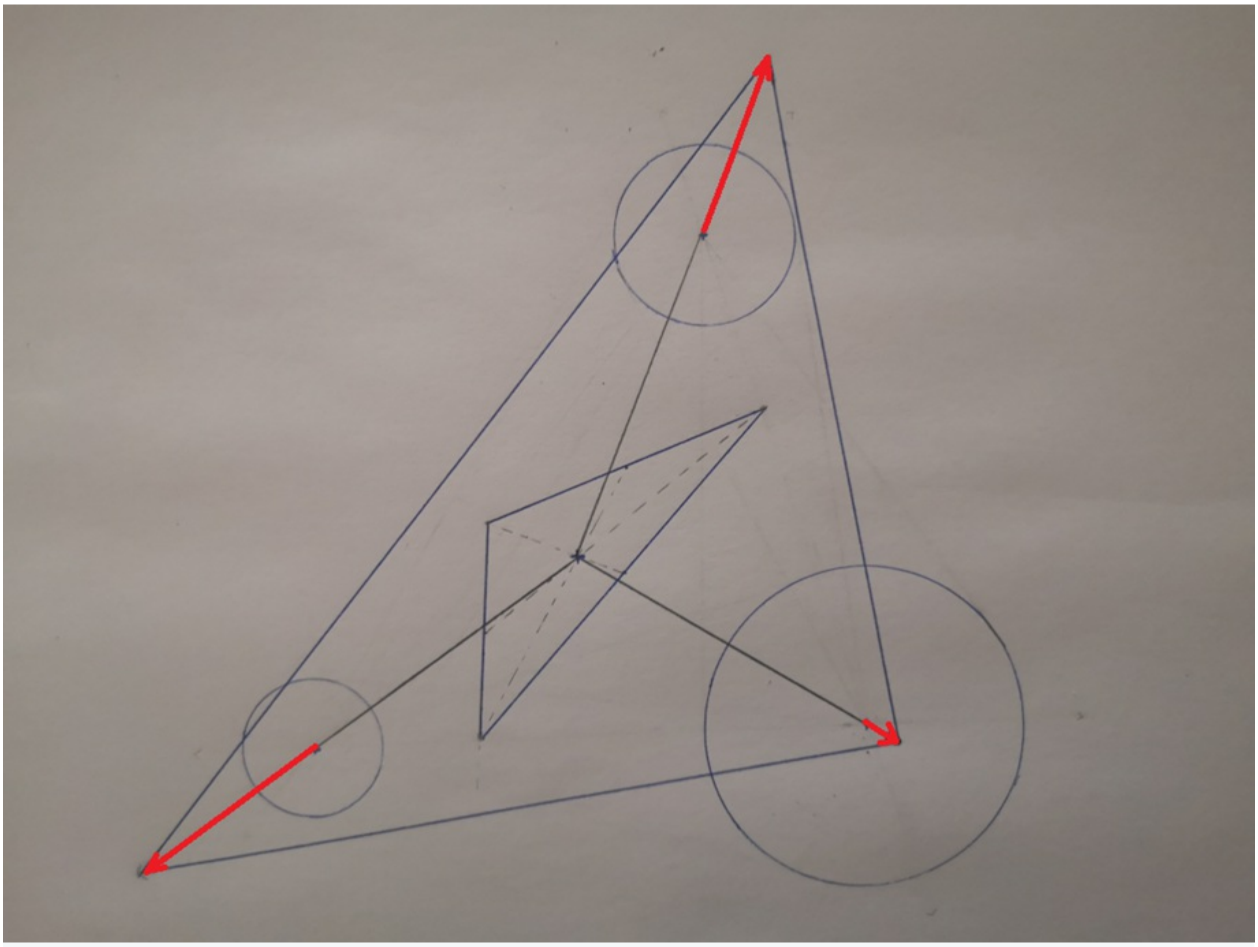

Fig. 3. Individual center of mass displaced

4. Calculate the new centroid, or center of mass

With each point calculated at **point 2** (each center of mass displaced), try a new centroid; this should be the new center of mass for the entire system, taking into account the motion. Using it, we could calculate all the positions at different moments.

The displacement gives the real individual center of mass.

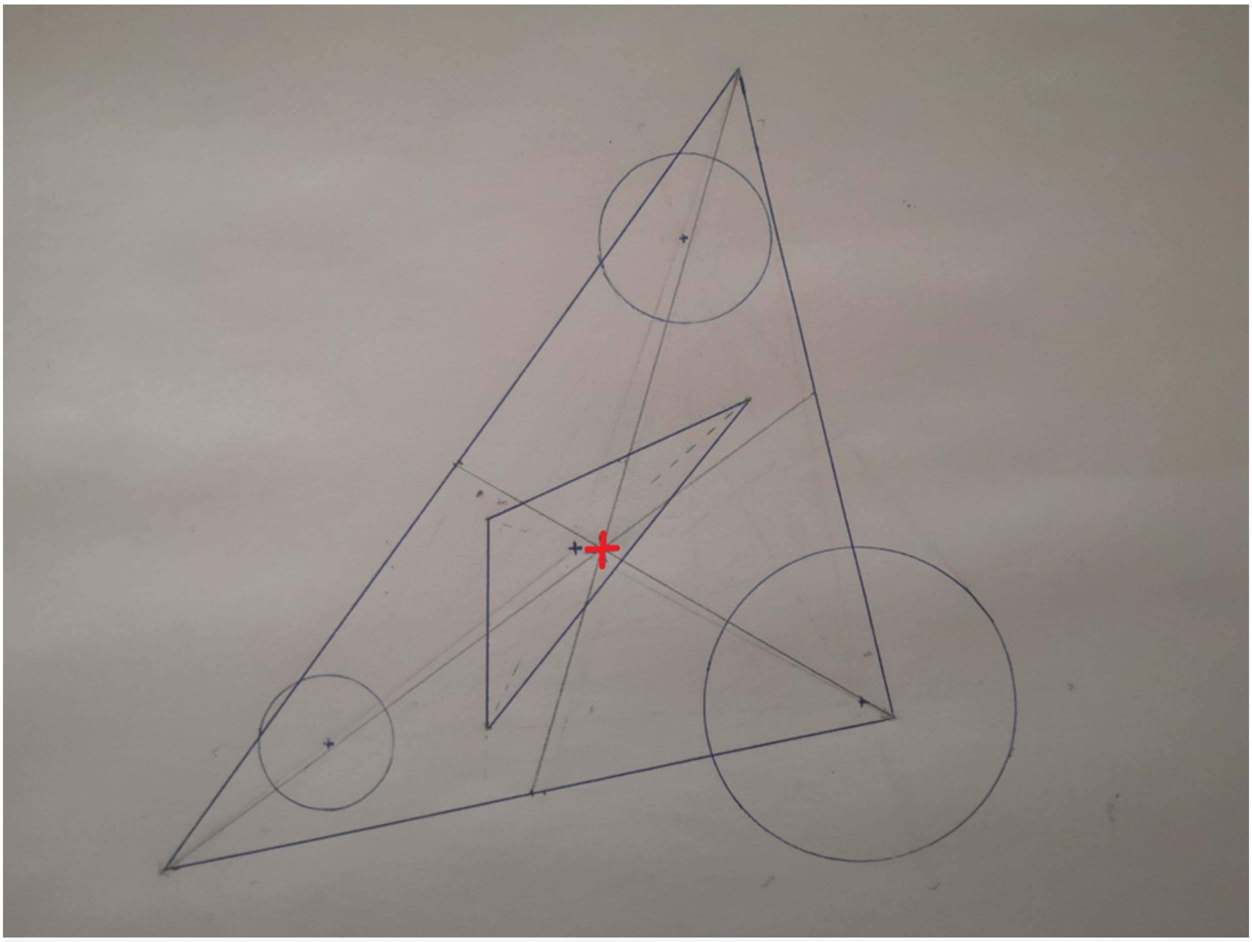

Fig. 4. Second centroid

To resolve the Three-body problem, there are more factors, for example, the initial center of mass of each individual body could have a not-well-known center (not all bodies are perfect spheres), or dust in the space which can distort the result. If this is not the problem, you can apply vectors in 3 dimensions or even more than 3 bodies...

Finally, this is an approximation in our solar system; in other galaxies, gravity and dark matter interact, and the initial calculations could be awesome taking into account my great theory **(Superconducting Field Theory, 2024)** [2]**, which shows how gravity force and dark matter interact (the gravitational constant can vary to calculate the first centroid)**.

For future moments, is not so complicated but calculating for past moments**(backwards)** could be much more complicated. We need to remove motion, not to add it like in this example. Step two is one, and one is two... Anyway, there is no a black box to try the **forwards or backwards** to do estimations and checks.

At last, we live in a universe based on triangulation...

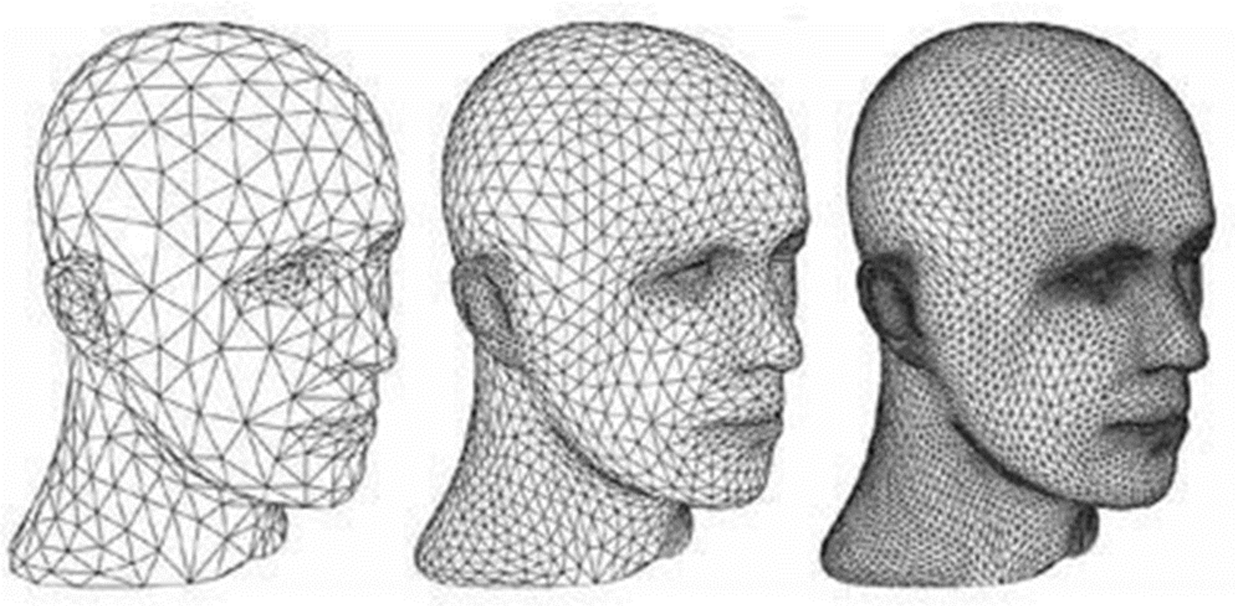

Fig. 5. Triangles are the basis of geometry

References

1. ^Sergio Pérez Felipe. (2024). Superconducting Field Theory (The Unification Theory). Qeios. doi:10.32388/AEL0YM.4.
2. ^Sergio Pérez Felipe. (2024). Superconducting Field Theory (The Unification Theory). Qeios. doi:10.32388/AEL0YM.4.