A method to determine co-ordinates of planetary objects/stars and other objects in the sky/space in 3-dimensional Euclidean space with respect to the Centre of the Universe

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ASSUMPTIONS

It is possible to determine Euclidean distance e.g. using the Parallax method (triangulation method) and other methods with a reasonable limit of accuracy for 3-Dimensional Space for the Observable Universe. It is a known fact that distances can be measured in space e.g. we know the distance of the moon from the earth, distances of various planets/stars from the Earth often quoted in light years.

Method to determine co-ordinates of the stars/planetary objects in Space

Let there be 'm' objects such as stars/planets whose co-ordinates one needs to measure in 3-dimensional space. And let there be 'n' sensors/transceivers or objects on the Earth or satellites in Space used for measuring distances of the objects in the sky away from it. Hence for 'm' satellites/objects the distances measured by the 'n' sensors/transceivers in 3-dimensional Euclidean space, with Centre of the Universe as a Frame of Reference, will be given by the following **distance equations** –

$(D11)^2 = (x11-y11)^2 + (x21-y21)^2 + (x31-y31)^2$

$(D12)^2 = (x12-y12)^2 + (x22-y22)^2 +(x31-y32)^2$

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$(Dmn)^2 = (x1m-y1n)^2 + (x2m-y2n)^2 +(x3m-y3n)^2$

Where,

(x1m, x2m, x3m) are co-ordinates of the m^{th} object in 3-D Euclidean Space,

(y1n, y2n, y3n) are co-ordinates of the n^{th} sensor/transceiver either on Earth or on a satellite measuring the distance of objects in the sky/space in 3-D Euclidean Space

And Dmn is the distance of the m^{th} object from the n^{th} sensor in 3-D Euclidean Space.

Therefore,

There are nm equations or distances measured in space which are known quantities (Refer to methods to measure distances in space e.g. Parallax method for stars/planets/objects in space)

And (3n+3m) co-ordinates or unknowns,

But, in order to know the unknowns in above equations using the known quantities,

nm must be equal to number of unknowns i.e. (3n +3m) Therefore,

$nm=3n+3m$

Case 1) Let m =1

Therefore,

$n = 3n + 3$ or $-2n = 3$

But as n and m are assumed to be finite integer quantities with values > 0, we reject this case.

Case 2) Let m=2

Therefore,

We get n=-6, n < 0 which is not possible.

We realize that the minimum value of m should be 4, so that n > 0. In other words, for m=4, n=12 or alternatively minimum value of n should be 4 for m=12, so that the number of unknown values is equal to the number of known values.

CONCLUSION

Using the minimum values of m and n, and the measurable known distances (Dmn) for these values of m and n the co-ordinates of the m^{th} planet/star can be determined with respect to the Centre of the Universe by solving the **distance equations** simultaneously using known methods to solve simultaneous determinate equations. As an aside, the co-ordinates of the 'n' sensors are also determined by solving the 'nm' simultaneous equations with respect to the Centre of the Universe.

Implications and potential applications

1. This can be used for Navigational systems in Space
2. Remote space probes
3. Track the movement of stars/planets/alien aircraft/ meteorites' etc in space.
4. And to stretch the imagination a little, it could be used to possibly to avoid space collisions and prevent impending meteorite crashes on earth.
5. Global positioning systems.

   Etc…

Summary and Scope for further research

The method can be extended to z-dimensional Euclidean space, we get, nm =zn+zm.

We can prove by mathematical induction that m-1=z (substitute suitable values for m and z for which n is a +ve integer and we will obtain the pattern m-1=z)

If distances can be measured in z-dimensional Euclidean space then it is possible to measure co-ordinates in z-dimensional Euclidean space.

The same above techniques can be applied possibly to other frames of reference other than z-dimensional Euclidean space.