Use Bernoulli's force to explain how galaxies move between them

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Abstract

In this paper, we try to solve the problem of motion between two adjacent galaxies by using the motion of the dark matter fluid driven by the rotation of galaxies. In this study, it is believed that when two adjacent galaxies differ in their direction and relative position, it is easy to lead to differences in the speed of dark matter fluid motion between the two galaxies, which will form the so-called Bernoulli force. This Bernoulli force is one of the reasons why the positions of galaxies in many of the multigalaxies we have observed so far are relatively random. If Newton's theory of gravity or general relativity is used to explain it, then the motion of galaxies due to gravitational effects purely should be circular. This is not quite the same as what we have observed. In fact, in the multigalaxies that we now observe, the movements of the various galaxies exhibit a state of random motion similar to Brownian motion. The existence of this state of random motion can be well explained by dark matter fluids. The estimates in this paper are also largely similar to those of my previous work that the effects of dark matter fluids are on the same order of magnitude as gravitational effects.

1 Introduction

The discovery of dark matter was originally intended to solve the anomaly of the motion curves of stars of galaxies [1], if there was no dark matter, the speed of the stars in a galaxy would slow down as they moved farther away from the center of the galaxy, but the actual observed phenomena showed that almost all the stars in a galaxy moved at basically the same speed. To solve this problem, it can be assumed that there is a large amount of dark matter in a galaxy, which surrounds the entire galaxy in a spherical state [2]. It's like a very large bubble formed around a galaxy. Jovica Vjestica, an aerodynamicist, envisions that all matter in galaxies, including the tiny nuclei of atoms, is made up of bubbles surrounding them [3]. When dark matter fluids flow through these bubbles, they are attracted by the Bernoulli effect. With this line of thinking, this study treats the dark matter sphere surrounding a galaxy as a whole, and when the galaxy rotates, the entire dark matter bubble drives the flow of dark matter fluid around it. If two adjacent galaxies rotate in different directions, the Bernoulli force will be generated due to the different velocities of the dark matter fluid between the two galaxies, which can cause the rotation direction of the galaxy to change.

2 Force analysis between adjacent galaxies

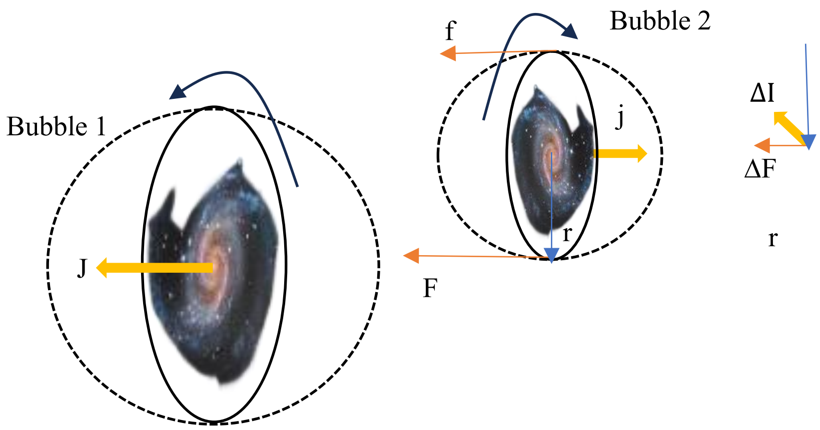

Fig. 1 Galaxies and dark matter bubbles

In the image above (Fig. 1), the two spiral galaxies, one large and one small, rotate in opposite directions. Due to the presence of dark matter, both galaxies are surrounded by dark matter bubbles. When the dark matter bubble rotates, it will drive the dark matter fluid to move.

The rotational velocities of the two galaxies Bubble are Ω and ω, and the angular momentum is J and j, respectively. Considering that the two galaxies rotate in opposite directions, driving the dark matter fluid, Bernoulli forces F and f are formed between the two. However, due to the difference in the positions of the two galaxies, F is slightly larger than f, which will form an angular momentum dj=ΔIdt in the direction of perpendicular j. This angular momentum will cause the galaxy on the right to drift away from its original direction.

The results of the actual observations are shown in the following figures. Therefore, the relationship between the positions of these galaxies, which occur in pairs and rotate in opposite directions, can be explained by the Bernoulli force of the dark matter fluid. Gravity, on the other hand, may not explain why these galaxies are in a state of separation rather than merging.

We can make a simple analysis of the entire force situation. For Bubble 2 in 1 in Fig. 1, because its rotation position is slightly away from the axis of rotation of the two galaxies, and the rotation of the galaxy drives the motion of the dark matter fluid, this deviation of this position causes the galaxy to be subjected to uneven force at both ends, one side of which is F, and the other side is f, so that there is a force difference:

$$\Delta F = F - f$$

This force difference results in a moment that reverses the direction of rotation of the galaxy:

$$\Delta I = r\Delta F$$

$$dj = \Delta I dt$$

It can be seen that this moment will result in an increasing amount of change in angular momentum over time. If the moment difference ΔI does not change with time, then

$$\Delta j = \Delta M \Delta t$$

This angular momentum is combined with the rotational angular momentum j of the galaxy to form a new direction of angular momentum, the magnitude of which is:

$$d\boldsymbol{L} = \boldsymbol{j} + d\boldsymbol{j}$$

If the moment difference does not change with time, then

$$\Delta L = \sqrt{j^2 + \Delta j^2}$$

3 Simple estimates

If the mass of small galactic Bubble2 consists of dark matter is $m_2 = 1.2 \times 10^{43} kg$

The mass of the large galaxy Bubble1 consists of dark matter is $m_1 = 2.4 \times 10^{43} kg$

The distance between the two galaxies is $r = 2.5 \times 10^{22} m$

Through Newton's gravitational force calculation formula, it can be calculated that the gravitational force between two galaxies is

$$F_g = G\frac{m_1 m_2}{r^2} = 6.67 \times 10^{-11} \times \frac{2.88 \times 10^{86}}{6.25 \times 10^{44}} \approx 3.07 \times 10^{31} (N) \quad (1)$$

If Bubble2 moves in a circular motion around Bubble1, we can approximate the velocity of Bubble2 as

$$v = \sqrt{\frac{F_g r}{m_2}} = \sqrt{\frac{3.07 \times 10^{31} \times 2.5 \times 10^{22}}{1.2 \times 10^{43}}} \approx 2.77 \times 10^5 (m/s) \quad (2)$$

It can be seen that as long as the speed of operation is 277 kilometers per second, one galaxy can move in a circle around another galaxy. However, as far as we can see now, it seems that the movement between galaxies is not in a circular motion. For example, in the Stephen Quintet, from the relative positions of the five galaxies, they are more like a random motion, like the Brownian motion of particles. And if the galaxy moves due to Bernoulli's force, according to the formula for calculating Bernoulli's force

$$p_1 + \frac{1}{2}\rho v_1^2 = p_2 + \frac{1}{2}\rho v_2^2 \tag{3}$$

Considering that the average diameter of the two galaxies is 100,000 light-years, i.e., $D \approx 10^{21}m$, if the width of the dark matter flow between the bubbles of the two galaxies is equal to *D*, it can be calculated that the cross-sectional area of the dark matter fluid flowing between the two galaxies at the entrance is approximate

$$S_1 \approx 2.5 \times 10^{22} \times 10^{21} \approx 2.5 \times 10^{43} (m^2)$$

The distance between the two galaxies is $2.5 \times 10^{22}m$. The cross-sectional area at the nearest point between the dark matter bubbles of the two galaxies is

$$S_2 \approx (2.5 \times 10^{22} - 10^{21}) \times 10^{21} \approx 2.4 \times 10^{43} (m^2)$$

According to the law of continuity, it can be calculated

$$\frac{v_2}{v_1} = \frac{S_1}{S_2} \approx 1.04$$

It can be estimated that the attraction of the dark matter fluid between two galaxies due to the presence of the dark matter bubble of the two galaxies is

$$\Delta p = p_1 - p_2 = \frac{1}{2}\rho v_2^2 - \frac{1}{2}\rho v_1^2 \approx \frac{1}{2}\rho \times 0.082 v_1^2 \approx 0.041 \rho v_1^2$$

Then

$$\Delta F = |\Delta p S| = 0.041 \times \pi \times \left(\frac{10^{21}}{2}\right)^2 \rho v_1^2 \approx 3.22 \times 10^{40} \rho v_1^2 (N)$$

Considering that the speed of the galaxy is about 300 km/s, it can be estimated

$$v_1 \approx 3 \times 10^5 m/s$$

So

$$\Delta F \approx 3.22 \times 10^{40} \rho v_1^2 \approx 2.9 \times 10^{51} \rho (N)$$

If we assume that dark matter accounts for 80% of the matter in a galaxy and is evenly distributed across galaxies, we can estimate the density of dark matter to be approximate

$$\rho \approx \frac{1.2 \times 10^{43} \times 0.8}{\frac{4}{3}\pi\left(\frac{10^{21}}{2}\right)^{3}} \approx 2.87 \times 10^{-20}(kg/m^{3})$$

In this formula, the total mass of a galaxy Bubble, including visible matter, is divided by the volume of the Bubble to obtain the density of the dark matter fluid. It is assumed that the density of dark matter in the galaxy is equal to the density of the dark matter fluid outside the galaxy. This can be calculated

$$\Delta F \approx 8.3 \times 10^{31}(N) \tag{4}$$

It can be seen that the Bernoulli force caused by the flow of dark matter fluids is of the same magnitude as the gravitational F_g calculated in equation (1) above. This is basically consistent with my previous calculations [4], which means that the effects of dark matter fluids are about the same as gravitational effects by orders of magnitude. This may illustrate: 1. Is gravity related to Bernoulli's force in dark matter fluids? Or is gravity the Bernoulli force of dark matter fluids? 2. The Bernoulli force produced by dark matter fluids is the same as the gravitational force, which means that we may easily ignore the Bernoulli force of this dark matter fluid and confuse it with gravity. But in any case, the Bernoulli force produced by dark matter fluids is not limited by the speed of light, so it can act instantaneously. So on a cosmic scale, at least we don't need to think about the delay effect on which gravitational interactions depend.

4 Conclusions

Through the analysis of this paper, we believe that the possible applicability of the theory of gravity on a very large cosmic scale is limited, that is, many phenomena of the universe may not be fully explained by the theory of gravity. In the very vast universe, gravity may be a microscopic interaction similar to what we see. This microscopic interaction is mainly limited by the fact that the propagation speed of gravity is only the speed of light, so that gravity may be a microscopic force on the scale of the universe. If the phenomena of the universe cannot be fully explained by the theory of gravity, then we may need a force that exceeds the speed of light of the gravitational force of the universe to explain the phenomena in the universe. The Bernoulli effect caused by dark matter fluids should explain to some extent many inexplicable cosmic phenomena in the past.

In the process of writing this paper, I had a very useful discussion with Jovica Vjestica, an aircraft maintenance engineer and aerodynamicist from Toronto, Canada, and I would like to thank him for the good inspiration.

References

[1] Oort, J. H. (1932). The force exerted by the stellar system in the direction perpendicular to the galactic plane and some related problems. Bulletin of the Astronomical Institutes of the

Netherlands, Vol. 6, p. 249, 6, 249.

[2] Bunting, P. C., Gratta, G., Melia, T., & Rajendran, S. (2017). Magnetic bubble chambers and sub-GeV dark matter direct detection. Physical Review D, 95(9), 095001.

[3] Chris McGinty, Jovica Vjestica. The Unified Fluid Dynamics Equation(UFDE): Integrating Jovica Vjestica's Fluid Mechanics Insights with the McGinty Equation Framework. Skywise.ai 2024.

[4] Cheng, Z. Estimation of Dark Matter Fluid Parameters and Their Influence on Galaxy Motion. viXra.org > Relativity and Cosmology > viXra:2308.0081. https://vixra.org/abs/2308.0081

Appendix:

Several photos of multiple galaxies from the Hubble Telescope, etc.


NASA, ESA, Hubble
Compilation: Douglas Gardner