ABSTRACT

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The paper discusses the development of a model for the distribution of matter in the universe, focusing on the concept of gravitational lensing. The authors derive equations to describe the behavior of light as it passes through the gravitational field of massive objects, leading to the observed distortions in the observed images of distant galaxies. The key equations are:

\[ \frac{\partial f}{\partial r} = a \cdot \Delta \epsilon + b \cdot \Delta \alpha \]

\[ \frac{\partial f}{\partial \epsilon} = a \cdot \Delta \epsilon + b \cdot \Delta \alpha \]

Where \( f \) is the flux density of the light, \( r \) is the radial distance, \( \epsilon \) and \( \alpha \) are coordinates in the lensing potential, and \( a \) and \( b \) are constants related to the mass distribution of the lensing object.

The paper also introduces the concept of the shear, defined as the rate of change of the shear parameter with respect to the lensing potential. This is crucial for understanding the shape distortion of galaxies as they pass through the gravitational field of massive objects.

The authors conclude that these equations provide a framework for understanding the complex effects of gravitational lensing on distant objects, which can be used to infer the mass distribution of large-scale structures in the universe.
(2.18) $\phi_{*} [\left\{ \left( \frac{\mathcal{W}}{W} \right)^{z} \frac{\partial}{\partial z} \right\}^{z} + (1 - i)] \times \frac{\mathcal{W}}{z} (\frac{\mathcal{W}}{W} \frac{\partial}{\partial z} x) \left( \frac{\mathcal{W}}{W} \frac{\partial}{\partial z} \right) \right) = (1)$

for a purely radial velocity field. Equation (2.18) can be written in terms of the $\phi_{*}$ function as

$$\phi_{*} [\left\{ \left( \frac{\mathcal{W}}{W} \right)^{z} \frac{\partial}{\partial z} \right\}^{z} + (1 - i)] \times \frac{\mathcal{W}}{z} (\frac{\mathcal{W}}{W} \frac{\partial}{\partial z} x) \left( \frac{\mathcal{W}}{W} \frac{\partial}{\partial z} \right) \right) = (1)$

The radiation pressure in the form 

$$\phi_{r} = \frac{d x}{d V} \left( \frac{\mathcal{W}}{W} \frac{\partial}{\partial z} \right) \right) = (1)$$

where $\phi_{r}$ is the radiative force component. Following the equation of motion for a gas, we can write

$$\frac{d x}{d V} = (1)$$

and the radiative flux in the photonsphere

$$\gamma d \theta = (1)$$

with the initial velocity of the cloud

$$\gamma d \theta = (1)$$

and the photon magnetic flux at the photosphere

$$\gamma d \theta = (1)$$

with the magnetic field of the photon.

We will adopt the opacity-independent depth scale.

We will assume that the opacity is independent of the opacity. The number of photons $N_{\gamma}$ is $\gamma$-independent. The number of photons is $\gamma$-independent.

The solution of the equation of motion is

$$\frac{d x}{d V} = (1)$$

where $\gamma$ is a constant and $T$ is in units of an arbitrary temperature.
\[ \frac{dx}{d\tau} = \frac{(x)\Omega}{\Delta} (\omega + 1) \]

The form of the equation (2) can be written in terms of the assumptions that the mass density of the system is constant and that the expansion of the system is uniform. The equation represents the rate of change of the system's mass with respect to time, where \( x \) is the mass fraction of the system and \( \Omega \) is the density parameter.

Different boundary conditions are considered in the section. The equation is derived using the assumption of a uniform expansion of the universe and that the mass density is constant. The equation is solved for different boundary conditions.

Note that from equation (4), if \( \Gamma = 0 \) in a constant volume,

\[ \frac{\partial\rho}{\partial\rho} = \frac{\Delta}{\rho} \]

and

\[ \frac{\partial}{\partial\rho} \left( \frac{\Delta}{\rho} \right) = \frac{\Gamma}{\rho} \]

where we have defined

\[ \Gamma = \frac{x}{\Delta} \frac{\partial x}{\partial\rho} = \frac{x^2}{\Delta} \frac{\partial x}{\partial\rho} \]

The mass density is given as a function of the mass fraction of the system.

The equations are solved for different boundary conditions, and the results are presented in the section.
The dependence of the luminosity of a hot stellar system on the mass and radius of the system is discussed. The luminosity is given by the equation:

\[ L = \frac{2\pi}{\sigma^2} \frac{dV}{dt} \]

where \( L \) is the luminosity, \( \sigma \) is the velocity dispersion, and \( dV/dt \) is the rate of change of velocity.

The equation for the solution of the luminosity problem is given by:

\[ \frac{d}{dx} \left( \frac{dV}{dx} \right) = \frac{d}{dx} \left( \frac{dV}{dx} \right) \]

and

\[ \frac{d}{dx} \left( \frac{dV}{dx} \right) = \left( \frac{dV}{dx} \right) \]

These equations are solved to find the luminosity of the system.

In order to find the exact value of the luminosity, a more detailed study is needed. The results of this study will be published in a forthcoming paper.

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3 Solutions for $\psi(x)$

Distribution of the parameter $\psi(x)$ is shown in Figure 5. The equation in terms of the parameter $\psi(x)$ is divided into two regions:

\[ \psi(x) \begin{cases} \frac{1}{2} \left( 1 - e^{-\psi(x)} \right) & \text{for } 0 < x < \psi(x), \\
\frac{1}{2} \left( 1 + e^{-\psi(x)} \right) & \text{for } \psi(x) < x < \infty. \end{cases} \]

For $0 < x < \psi(x)$:

\[ \frac{1}{2} \left( 1 - e^{-\psi(x)} \right) > \frac{1}{2} \]

For $\psi(x) < x < \infty$:

\[ \frac{1}{2} \left( 1 + e^{-\psi(x)} \right) > \frac{1}{2} \]

In such a way, the solution for $\psi(x)$ is provided.
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4. SUMMARY AND CONCLUSIONS

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