A new contributor to the non-Linearity of red-shift-distance-curve observed by Perlmutter and Riess: Namely the 'additional-red-shift' caused due to the 'rate-of-change-of-brightness-with-distance'

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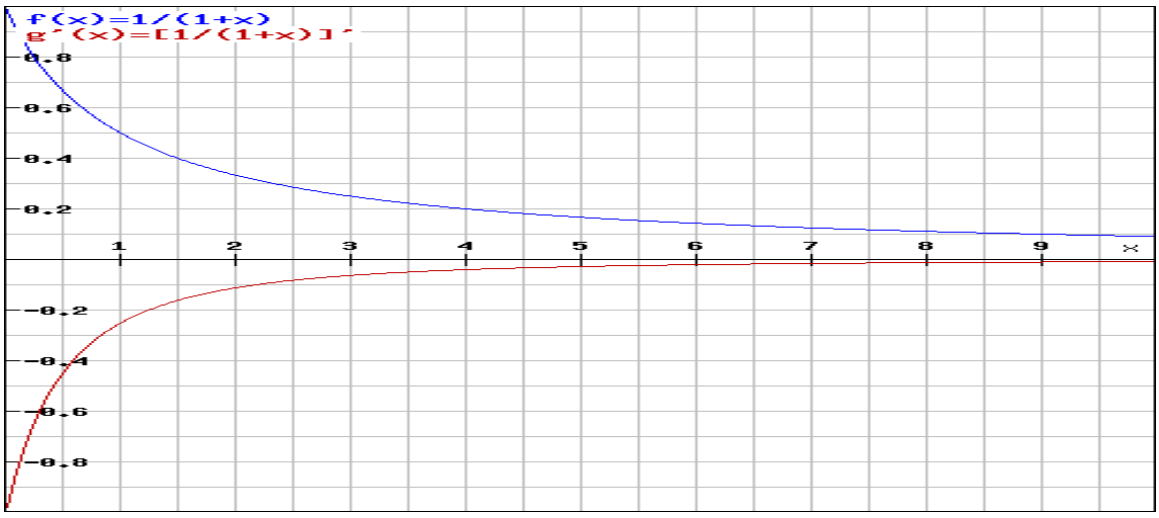
Abstract: According to the inverse square law, the brightness of every source-of-light reduces with distance. And the *rate of reduction of brightness* at various radial distances keeps on reducing with distance. From our experience of 'amplitude-modulation', we know that change of amplitude of a stable, single-frequency-source produces a wide spectrum, depending upon the '*rate-of-change-of-amplitude'*; so the varying '*rate-of-reduction-of-brightness'* with distance of the galaxies and super-novae, must have contributed 'additional-red-shift'; in addition to the well known Doppler-shift. It is proposed here, that: since this 'additional-contribution-to-the-red-shift' is non-linear, the 'red-shift-distance-curve' observed by Perlmutter and Riess shows non-linearity; but this 'additional-contribution-to-the-red-shift' does not mean 'additional-recession-of-galaxies' and 'accelerated-expansion-of-the-universe'.

The Description:
According to the inverse square law, the brightness of every source-of-light reduces with distance, as shown in fig.1, (blue curve). On the surface of atoms, at a distance of one atomic-radius, say the brightness is one-unit; and with the increase of radial distance the brightness reduces as shown in fig-1, blue-curve:



Fif.1: Showing reduction in brightness with distance from the surface of emitting atoms (the blue curve). And the *rate of reduction of brightness* at various radial distances (the red curve). From this figure we find that the rate of reduction of brightness keeps on changing with radial distance; as can be seen in the red curve.

We also know that light is electromagnetic waves, so when amplitude of any wave reduces with time at certain rate, then its frequency also gets red shifted depending upon the *rate of reduction of the brightness.* This is the reason why in the case of 'amplitude-modulation', in which only the amplitude of single-frequency-sine-wave is changed, also causes a wide spectrum; depending upon the *rate of change of amplitude* of that single-frequency-sine-wave [1].

To understand the mechanism of frequency-shift with the rate-of-reduction-of-brightness, perform the following experiment: Mount a one-kilohertz speaker at the back of a car, moving away from you at a constant speed. Take two microphones. Connect one to a linear amplifier, and the other microphone to a limiter-amplifier; so that you get two signals, one of which has distance-dependent-amplitude, whereas the other has constant amplitude. Using a dual-beam-spectrum-analyzer you can compare the spectra of signals from both the amplifiers; and you will find, that the frequency-shift of the signal coming from 'limiter-amplifier', which is purely due to the well known Doppler-effect, is lesser than the frequency-shift of the other signal coming from linear-amplifier, which has got red-shifted due to two mechanisms, one due to Doppler-effect and the other due to the *rate-of-change-of-amplitude* of the received signal. This red-shift, due to the rate-of-change-of-amplitude of the signal, is termed as 'additional-red-shift' in this note.

Now, according to the 'Big Bang Theory', all the galaxies are moving away from each other, at the velocities proportional to their distance from us. If so, then, we should be able to measure, that the brightness of all the galaxies and super novae reducing with time; and as shown in the fig.1 red curve, the *rate of reduction of brightness* should go on reducing with time; and the additional red shift, caused due to rate-of-reduction-of-brightness should go on reducing with time. Since the additional-contribution to the observed red-shift goes on reducing with distance, as can be seen from the green curve of the fig.2., we measure lesser and lesser red-shifts than expected at those distances. It is proposed here, that so far we have been interpreting the whole red-shift as due to recessional-velocities [2,3]; whereas as we discussed here, the additional-contributor to the red-shift, namely due to the rate-of-reduction-of-brightness with distance, does not mean 'additional-recession-of-galaxies' and 'accelerated-expansion-of-the-universe'.

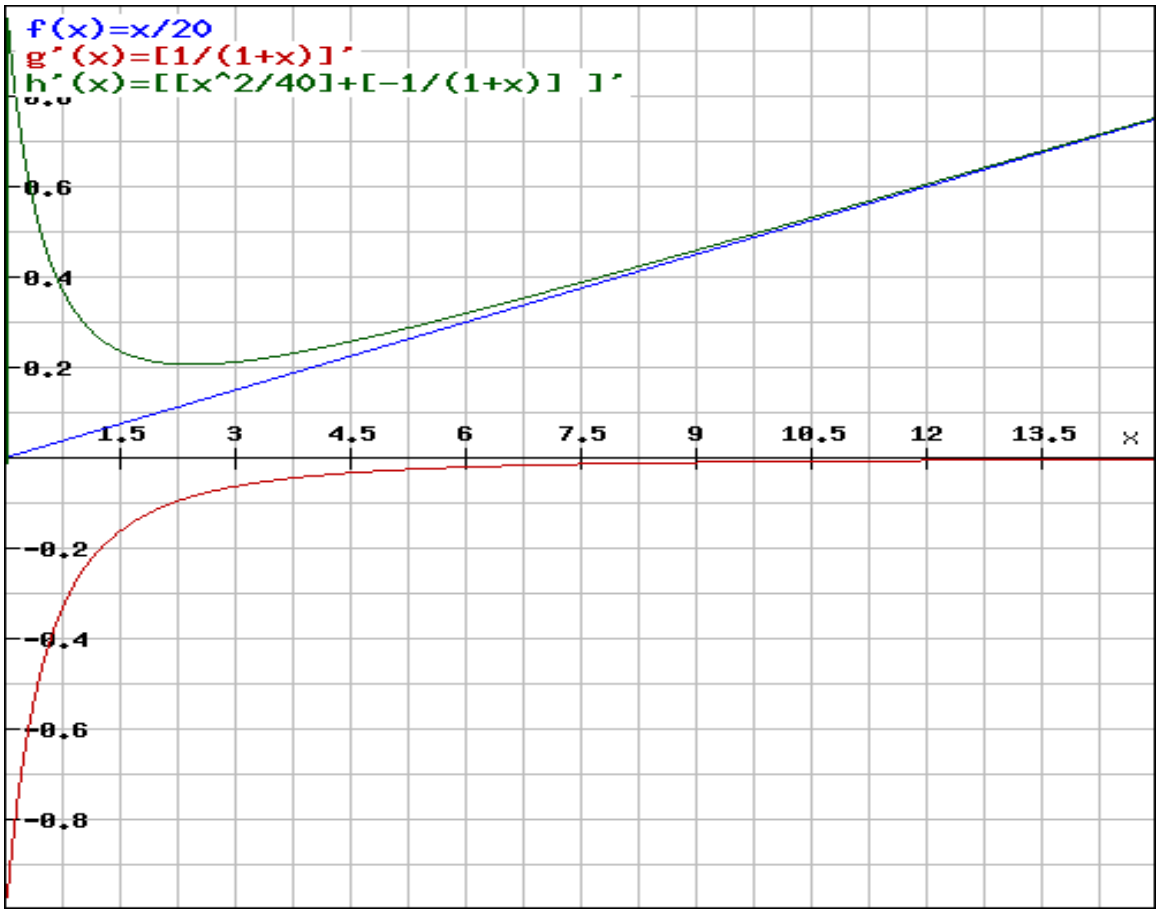


Fig. 2: (a) Blue-curve showing linear part of the Red-shift-Distance-Curve; (b) Red curve showing the rate-of-reduction-of-brightness with distance from the emitting atoms; which should cause additional red-shift, as discussed in this note. (c) Green curve showing the sum of red-shifts due to two mechanisms, one, the well known Doppler shift; and two the additional red-shift caused due to the rate-of-reduction-of-brightness, as discussed in this note.

References:

[1] Lathi, B. P. Communication Systems, Oxford University Press, 1998.

[2] Perlmutter, S. *et al* (1999) *Astrophysical Journal* **517** (2): 565–86

[3] Riess, A. G. *et al.* (1998) *Astronomical J.* **116** (3): 1009–38