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Absorption and Dispersion for Classical Forced, Nonlinear Oscillators of Atomic Oscillators 'KALE OYEDEJI, Morehouse College, RONALD MICKENS, Clark Atlanta University — The classical explanation for absorption and dispersion is based on a physical model of forced, damped oscillations of atomic oscillators, i.e., electrons, driven by an electromagnetic wave [1]. From this theory one can derive the so-called " f " values which are related to the transition probabilities. A general mathematical formulation for these phenomena can be modeled by the expression

$$m\cdot\cdot x + D(\cdot x) + g(x) = F_0 \cos(\omega t), * \tag{1}$$

where $D(-z) = -D(z)$, $D(0) = 0$, $D(z)$ monotonic increasing; and $g(x)$ having exactly the same properties. Our main goal is to show that the relevant derived expressions for the effects of absorption and dispersion are insensitive to the exact functional forms used for $D(z)$ and $g(x)$. Our methodology is based on the application of the harmonic balance procedure to calculate an approximation to the periodic solution of Eq. (*). In addition to explaining physically why this result should be expected, we briefly discuss the "similar" case of Brownian motion. Our findings are consistent with the understanding that in the absence of a fundamental theory, macro-physical phenomena will not depend on the details of the micro-physics. [1] A. Thorne,Spectrophysics...

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