Abstract Submitted
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Investigation of an Unforced Duffing Equation having Fractional Power Damping RONALD E. MICKENS[1], Physics Department, Clark Atlanta University, RAY BULLOCK[2], W. EUGENE COLLINS[3], The Center of Physics and Chemistry of Materials, Fisk University — The Duffing ODE provides a standard model for nonlinear oscillations for a broad range of phenomena in the natural and engineering sciences. The effects of dissipation are generally included by adding a "friction" force term, $f(v)$, proportional to an integer power of the velocity. Thus, oscillations take place, but with a decreasing amplitude, and which only decrease to zero in an infinite time interval. We examine the case where $f(v) = -av^p$, $a > 0$ and $0 < p < 1$, and demonstrate that the amplitude of the oscillations become zero in a finite time [1]. This result may have relevance for the vibrations of carbon nanotubes and sheets of graphene sheets [2].

[1] R. E. Mickens, Truly Nonlinear Oscillators (World Scientific, London, 2010).
[2] A. Eichler et al., Nature Nanotechnology, Vol. 6 (June 2011), 339–342.

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