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Approximate Solutions to $d^2x/dt^2 + [1+(dx/dt)^2]x = 0$ Using a Polar Representation 'KALE OYEDEJI, Morehouse College, RONALD E. MICKENS — It can be shown that the following nonlinear differential equation

$$d^{2}x/dt^{2} + [1+(dx/dt)^{2}]x = 0$$

has only periodic solutions. The application of standard perturbation methods, harmonic balance, and other approximation techniques all reach the conclusion that the angular frequency has a singularity for a finite value of the initial amplitude A, where the initial conditions are x(0) = A and dx(0)/dt = 0. Since a phase-space analysis demonstrates that such a singularity does not exist, we must seek other methods to give the required valid behavior for the angular frequency as a function or the initial amplitude. This presentation reports our work using a method based on a polar representation for the periodic solutions. We compare these results with a priori calculations and give an explanation as to why the earlier calculations were "interpreted" as being incorrect.

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