Abstract Submitted
for the SES15 Meeting of
The American Physical Society

Mathematical Analysis of a Singular, Nonlinear, Periodically Driven Oscillator RONALD MICKENS, Clark Atlanta University — We investigate the possible solutions of the second-order differential equation

$$m\cdot\cdot x + \cdot x + x^3 = \sin t, * \tag{1}$$

for the limiting case where $m = 0$. Applying the method of harmonic balance [1], we determine both first- and second-order approximations to the periodic solution. We also show, using the qualitative theory of differential equations [2], that this periodic solution is an attractor, i.e., regardless of the initial condition, $x_0 = x(0)$, the solution eventually becomes arbitrarily close to this periodic solution. This work extends the results of Elias [3]. [1] Ronald E. Mickens., *Oscillations in Planar*

Dynamic Systems (World Scientific, Singapore, 1996); see Chapter 4. [2] See ref. [1], Appendix I. [3] U. Elias, *Qualitative analysis of a differential equation of Abel*, MAA Monthly (February 2008), pps. 147-149.

Ronald Mickens
Clark Atlanta University

Date submitted: 13 Oct 2015 Electronic form version 1.4