1056-34-420 **Dorian Wilkerson*** (`rohrs@math.gatech.edu`), Physics Department, Box 1744, Atlanta, GA 30314. *Analysis of a Truly Nonlinear Oscillator.*

We investigate the mathematical properties of solutions to the truly nonlinear (TNL) oscillator differential equation

$$(*) \qquad \ddot{x} + x^{1/3} = 0.$$

In particular, we demonstrate that all solutions are periodic. Two procedures, the methods of harmonic balance and iteration, are used to construct approximations to the periodic solutions. A measure of the accuracy of the approximations is provided by calculating the percentage errors in the associated angular frequencies. (Received September 05, 2009)