1086-34-121 **'Kale Oyedeji*** (koyedeji@morehouse.edu), Department of Physics, Morehouse College, Atlanta, GA 30314-3773. *Determination of Approximate Solutions to Non-linear Oscillatory Differential Equations.*

There has been much interest in solving non-linear differential equations which describe the oscillatory motion of systems which may be represented by differential equations of the form

$$\ddot{x} + g(x) = \varepsilon f(x, \dot{x}), \qquad 0 < \varepsilon < 1,$$

where $g(x)$ and $f(x, \dot{x})$ are odd functions. In general, this equation cannot be solved exactly and therefore methods must be devised to construct analytical approximations to the solutions. The issue then is to determine which procedures may be used to construct valid methods which will allow the determination of these analytical approximations. A technique combining the method of first-order averaging and iteration is presented. This technique is based on transforming from a cartesian coordinate representation to one involving polar coordinates [1]. The procedure is illustrated by applying it to a number of specific differential equations having oscillatory solutions.

Reference

[1] Ronald E. Mickens and 'Kale Oyedeji, Comments on the general dynamics of the nonlinear oscillator $\ddot{x}+(1+\dot{x}^2)x = 0$, *Journal of Sound and Vibration* **330** (2011) 4196-4200. (Received July 25, 2012)