1109-92-134 **Garrett Divens*** (garrett.divens@morehouse.edu), Department of Mathematics, Morehouse College, Atlanta, GA 30314, and **Ronald E. Mickens** (rmickens@cau.edu), Department of Physics, Clark Atlanta University, Atlanta, GA 30314. *Exact Solution to A SIR Model with Population Growth.*

AMS Classification Number: 92D25, 92D30

Key Words: SIR models, spread of disease, nonlinear analysis, exact solutions

A particular (nonstandard) representation, from the class of SIR models for spread of disease, is [1]

$$\frac{dS}{dt} = a\sqrt{S} - bS - \beta\sqrt{S}\sqrt{I}, \tag{1}$$

$$\frac{dI}{dt} = \beta\sqrt{S}\sqrt{I} - \gamma\sqrt{I}, \tag{2}$$

where the mathematical relation for dR/dt is not required. By means of a nonlinear transformation for the dependent variables, S and I, we can obtain a set of two, coupled, linear differential equations and for these an exact solution can be determined. An interesting and very important feature is that this system has finite time dynamics, i.e., $I(t)$ goes to zero in a finite time. We also show that (1) and (2) may be rewritten to equivalent forms such that the new parameters have direct epidemiological meanings.

Reference

1. R.E. Mickens, The College Mathematics Journal, Vol.437 (2012), 114-121. (Received January 28, 2015)