

1154-39-1989

William S Dula* (william.dula@students.cau.edu) and **Ronald E Mickens**. *Exact and Nonstandard Finite Difference Schemes for a Modified Law of Cooling.*

We construct a first-order, nonlinear differential equation to model cooling and heating of a system embedded in a constant temperature environment. The equation generalizes the standard Newton “Law of Cooling” by including an additional nonlinear term which allows for the system to achieve the equilibrium temperature in a finite time. The major goal of this work is to demonstrate that finite difference schemes exist such that they are dynamically consistent with the major features of the physical system. Both exact and NSFD schemes are formulated and their numerics are investigated, including a detailed comparison of their corresponding numerical solutions. (Received September 17, 2019)