1023-L5-33 **Ronald E. Mickens*** (rohrs@math.gatech.edu), Clark Atlanta University, Box 1744 - Physics Department, Atlanta, GA 30314. *A Combustion Model Exhibiting Metastability.*

In general few of the mathematical models for realistic chemical phenomena have known exact analytical solutions. For students in physical chemistry courses, there are advantages for them to work with differential equations modeling interesting systems that can be studied using elementary methods. An ideal example is the first-order, nonlinear ODE for combustion exhibiting metastability. This model was introduced by E. L. Reiss [SIAM J. Appl. Math. 39 (1980) 440–455] and contains two nonlinear concentration terms and associated rate constants. Using dimensional analysis and various linear approximations, we calculate several time scales and use them to estimate when (in time) the metastability occurs as well as the time to complete the burning. This work demonstrates that a full analysis of a complex chemical process can be done using only elementary mathematical techniques. We also state how these methods can be applied to other problems in a physical chemistry course. (Received July 07, 2006)