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Finite-Time Dynamic Systems 'KALE OYEDEJI, Morehouse College, Atlanta, GA 30314-3773, RONALD E. MICKENS, Clark Atlanta University, Atlanta, GA 30314 — While the mathematical models of many important physical systems have dynamics taking place over an infinite time interval, in practice these systems cease their "actions" in finite times. Particular examples of such systems include a liquid flowing out of a hole in the side of a cylinder, the oscillations of a nonlinear vibrator, the cooling and/or heating of an object in a constant temperature environment, and a particle acted upon only by a purely resistive force. We show that all these cases can be unified within the framework of a single mathematical structure. We also discuss and examine closely the role played by the existence and uniqueness theorems of differential equations, and why, in spite of the fact that the usual conditions do not hold, unique solutions do exist, and this is fully in agreement with the physics controlling the dynamics of these systems.

'Kale Oyedeji
Morehouse College, Atlanta, GA 30314-3773

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