1073-34-123 **Kale Oyedeji*** (koyedeji@morehouse.edu), Morehouse College, Atlanta, GA 30314, and
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Mathematical Restrictions on Purely Dissipative Forces.

Friction or dissipative forces place important roles in the understanding of diverse phenomena in the natural and engineering sciences. However, in the construction of mathematical models for such systems such forces are generally taken to be linear functions of the velocity, i.e., proportional to the first time-derivative of a coordinate. For elementary systems, such a representation gives rise to dynamics which go to an equilibrium state after an arbitrarily long time, i.e., "infinite" time. But, in fact, actual systems as they occur in nature, reach equilibrium after a finite interval of time. Based on an extension of previous work by Mickens [1], it is shows that friction/dissipative force laws exist such that the dynamics is of finite duration. This important result follows from first formulating a clear, physical based derivation of the general properties of purely dissipative forces, and then analyzing in detail the possible solution behaviors of an elementary physical system acted on by a power-law type force. An interesting result is that dissipative forces exist for which the system does not "stop" in a finite time.

[1] R. E. Mickens, Nonlinear Oscillations (Cambridge University Press, 1981). (Received July 29, 2011)