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Exact Descriptions of General Relativity Derived from Newtonian Mechanics within Curved Geometries DAVID SAVICKAS, Western New England University — General relativity and Newtonian mechanics are shown to be exactly related when Newton's second law is written in a curved geometry by using the physical components of a vector as is defined in tensor calculus. By replacing length within the momentum's velocity by the vector metric in a curved geometry the second law can then be shown to be exactly identical to the geodesic equation of motion occurring in general relativity.[1] When time's vector direction is constant, as similarly occurs in Newtonian mechanics, this equation can be reduced to a curved three-dimensional equation of motion that yields the the Schwarzschild equations of motion for an isolated particle. They can be used to describe gravitational behavior for any array of masses for which the Newtonian gravitational potential is known, and is shown to describe a mass particle's behavior in the gravitational field of a thin mass-rod.[2] This use of Newton's laws allows relativistic behavior to be described in a physically comprehensible manner.

[1]D. Savickas, Am. J. Phys. 70, 798 (2002).
[2]D. Savickas, Int. J. Mod. Phys. D 23 1430018, (2014).

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