Extended Space Model is Consistent with the Photon Dynamics in the Gravitational Field

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Abstract. Extended space model (ESM) is a generalization of the special theory of relativity at a 5-dimensional space, and more specifically at (1 + 4) -dimensional space. Rotations in extended space correspond to the motion of a particle in gravity field in the embedded four-dimensional space-time. The possibility of a transition from the components of the 5-momentum of a particle in extended flat space to the components of a 4-momentum in an arbitrary4-dimensional space by means of rotations is considered. Variational principle of the stationary energy integral of photon allows us to determine its dynamics. We consider variation of energy of the light-like particle in the pseudo-Riemann space-time, find Lagrangian, canonical momenta and forces. We study how (TS)-rotation in ESM agrees with photon dynamics in the Schwarzschild field. Equations of the critical curve are obtained by the nonzero energy integral variation in accordance with principles of the calculus of variations in mechanics. This method is compared with the Fermat's principle for the stationary gravity field and geodesics principle. Energy and momentum of the particle transferred to the gravity field is defined. The produced equations are solved for the metrics of Schwarzschild and Goedel. The gravitation mass of the photon is found in central gravity field in the Newtonian limit.