

Light deflection and perihelion shift in the second post-Newtonian approximation of scalar-tensor theory of gravity

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In the previous paper, we have derived the metric coefficients and the equation of the hydrodynamics governing a perfect fluid in the 2nd post-Newtonian approximation in scalar-tensor theory. In this paper, we use these results (i) to derive the deflection of light and radio propagation and compare it with previous work, and (ii) to derive the perihelion shift for objects (planets, asteroids, and spacecraft) in a bound solar orbit. These results will be useful for deep space laser ranging missions like ASTROD I (Single-Spacecraft Astrodynamical Space Test of Relativity using Optical Devices) and ASTROD, and astrometry missions like GAIA and LATOR, which aim at testing relativistic gravity to 10^{-7} - 10^{-9} , and require 2nd post-Newtonian approximation for this accuracy. The applications to these missions are considered.