Perturbation equations for Schwarzschild geodesics

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In our work we consider geodesic equations in Schwarzschild space-time with arbitrary external forces and obtain Gaussian perturbation equations for osculating elements in terms of Weierstrass elliptic functions. As an application, we solve the perturbation equations analytically in linear approximation for forces induced by the presence of the cosmological constant in the Schwarzschild-de Sitter metric, which we compared with a known analytical solution. Also, we solve the perturbation equations for hybrid Schwarzschild/post-Newtonian 2.5 order self-forces.

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