

The main task of the work is to analyze the interaction of a particle with a spherically symmetric field in quantum mechanics using so-called Siegert states. In the first chapter we solve the scattering problem analytically for square well. Then we describe Siegert states and we demonstrate their influence on observable quantities (scattering cross of the interaction) using the analytic approach. In the second chapter we implement the numerical resolution of Schrödinger equation using the R-matrix method in the B-spline basis. In the third chapter we present results of the numerical method and validate it by comparison with the analytic solution obtained earlier. The main output of this work is implementation and verification of a numerical method enabling manipulation and analysis of S-matrix poles in simple radial scattering problems.