

## Abstract

The main aim of this thesis is the study of the dependence of the scale factor on the cosmic time for different models of Universe's evolution in the framework of the general theory of relativity. In this thesis we consider the FLRW metric and admit nonzero curvature. The models we consider differ from each other by the equation of state of the source, hence by the composition of the cosmic fluid under study. In this thesis the following models are discussed:  $\Lambda$ CDM (we consider a perfect cosmic fluid consisting of the incoherent dust, radiation and a cosmological constant in a curved space-time), generalized Chaplygin gas, and, also, two kinds of the scalar field (describing separately power-law inflation and the period after recombination). The numerical and analytical results obtained are processed graphically.