

Abstract: Gravitational lensing is a phenomenon caused by bending of light in the curved spacetime around an astrophysical object characterized by its distribution of mass. In this thesis we examine the properties and behaviour of several gravitational lens models with ellipsoidal symmetry. These models can be used for example for the description of galaxies or galaxy clusters, in particular, their dark-matter halos. The studied models include the recently analytically derived lens with mass distribution of Navarro-Frenk-White density profile (NFW model) and the commonly used models of a Nonsingular Isothermal Ellipsoid (NIE) and Truncated Nonsingular Isothermal Ellipsoid (TNIE). By examining the Jacobian of the lens equation we found critical curves and caustics of these models and we described the changes of the shapes and sizes of these curves as a function of the model parameters. Based on these results we compared the lensing regimes of the models and the structure of their parameter spaces.