

This thesis contains a set of articles concerned with flow of a viscous, compressible and heat conducting fluids in several kinds of domains. The first part is devoted to the existence of weak solutions in domains that may contain cusps. Next chapter is focused on the asymptotic limit of the equations of magnetohydrodynamics consisting of Navier-Stokes-Fourier system describing the evolution of fluid coupled with Maxwell equations governing the behavior of magnetic field with the low Mach and Alfvén number. At the end of the thesis, we study the asymptotic limit passage of the Navier-Stokes-Fourier system under the strong stratification defined in unbounded domain. Special attention is paid to the acoustic waves which analysis is based on local energy decay.