

In the present work we study the model of incompressible ionized mixtures from point of view of mathematical analysis and practical implementations. The model consists of the continuity equation, Navier-Stokes equations, Nernst-Planck equations and Poisson equation for the electric potential. We prove the existence of a weak solution for the model in three space dimensions. We also present a simple program for computing the solutions of Nernst-Planck equations and Poisson equation and use it to examine the problem that arise during the computation. The results in thermodynamics of mixtures are referred as the physical part of the thesis.