

Abstract

This work mainly concentrates on providing the mathematical background for a specific model of fractional in space diffusion. We will develop the theory of analytic semigroups for an operator given by divergence of fractional Caputo derivative. Subsequently, we will apply these results to obtain a solution to one-phase, one-dimensional fractional in space Stefan problem. We will also find a special solution to this problem by similarity variable method. The final part of thesis is devoted to fractional in time one-phase, one-dimensional Stefan model. We derive a model assuming that the diffusive flux is given by the time-fractional Riemann-Liouville derivative of gradient of transported substance. Then, we will obtain a special solution to this problem.

Key words: analytic semigroup theory, fractional Stefan problems, self-similar solutions