ABSTRACT

The thesis is presented in 40 pages. It contains 2 appendixes and bibliography of 12 references. Six figures and 1 table are given in the thesis.

The goal of the thesis is to develop mathematical and software tools for solving the problem of solenoidal filtering of noised measured velocity fields.

In the thesis, existing solutions are analyzed, such as those based on Helmholtz theorem, those defining a constrained optimization problem, and those based on reconstruction solenoidal basis. They are compared in terms of filtering efficiency, stability against large local measurement errors and existence of artificial smoothing of original data. In the thesis, solenoidal waveforms reconstruction method is used to solve the task.

Software that implements the chosen method is created. The program is tested, and the result is gained – filter allows to decrease noise for about 42% in average.

Keywords: solenoidal filtering, velocity measurements de-noising, sequential matching pursuit, magnetic resonance velocimetry, divergence-free filtering.