Abstract

The situation when groundwater considerably rises above the “normal” level, water intake, lowering of groundwater levels and other relevant practical tasks require the drainage facilities. The most effective techniques of numerical studies of the corresponding boundary problems at present time are methods of dealing with inverse boundary value problems (conformal and quasi-conformal mappings). As basis of this research we used the case of combining the fictitious domain methods with quasi-conformal mappings of the solution of nonlinear boundary value problems for the calculation of filtration regimes in environments with free boundary areas (depression curves) and zones of “mountainous” areas.

This paper reviews the stationary issue of flat-vertical stationary non-pressure liquid filtration to horizontal symmetric drainage. In the paper a practical methodology for solving boundary value problems on conformal mappings is suggested for the calculation of the filtration process in the horizontal symmetrical drainage.

The idea of block iterative methods was used during the creation of the corresponding algorithm which is based on the alternating “freeze” of the anticipated conformance parameter, the internal and boundary connections of the curvilinear area.

The results of the conducted numerical calculations confirmed the effectiveness of the suggested problem formulations and algorithms of their numerical solution and the possibility of their use in the modelling of nonlinear filtration processes occurring in horizontal drainage systems, as well as in the design of drainage facilities and optimizing other hydrosystems. Therefore these results are of great importance.

Key words: conformal mapping, drainage systems, filtration processes, flood protection, mathematical modelling