

## **DOMAIN DECOMPOSITION METHODS IN SOLVING HYDROGEOLOGY AND OIL GEOLOGY PROBLEMS**

NAUMKO O.I., SAVULA Y.H., Lviv State Ivan Franko University, Lviv, Ukraine

In the article the principal possibility of using domain decomposition methods for solving various problems of oil geology and hydrogeology is shown. Here belong, partly, problems of liquid flows within the sedimental terrigenous volumes which contain fine inclusions or fine boundaries, e.g., cracks, head-creating and oil-producing wells, heterogeneous inclusions in dams. The usual approach is to approximate fine inclusion (e.g. thin well) by the line of nodes of discretization scheme thus neglecting real shapes of boundary. One of the most efficient methods to avoid this simplification is alternating Schwarz method. According to this approach several finite element (FE) overlapping grids were created in accordance with characteristic size of each boundary, which allowed to preserve initial form of fine boundaries and generalize it to real conditions of geological and hydrogeological environment. The numerical results of solving model 2-dimensional problem are presented. The values of flows through hypothetical crack are calculated - both with and without contribution of gravity force, on both 1st and 2nd order FEs. The steady convergence of flow values by different grades of grids refinement allows to state about reliability of the method. The second set of calculated data contains flow values through the crack for various positions of crack in the rock layer. The presented numerical results of solving model problem show practical value of this approach.