Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Development of iterative algorithms of increased convergence and accuracy for multiphase flow simulation MAXIM FILATOV, Lomonosov Moscow State University, DMITRY MAKSIMOV, Keldysh Institute of Applied Mathematics — Newton's method is commonly used in reservoir simulation problems. However, it doesn't have the property of globally convergence (Younis et al., 2008). Most of the convergence problems are generally related to change of the nonlinear equation being solved during iteration process (Maksimov et al., 2010): 1) change of phase flow direction; 2) change of the well working target (fixed rate - limit bottom hole pressure - shut); 3) appearance and disappearance of a phase; 4) appearance of movable phase; 5) others, connected with problem formulation improvement. Note that the form of the approximating equations is unknown in advance and is determined by the solution itself. We have considered approaches of improving convergence of Newton's method for reservoir flow problems in general problem formulation, characterized by dependence of the equation approximation form on the solution itself and thus changing of the approximating equation during the iteration process. The approach is based on the universal principle of decreasing of each residual component in all cells. For determination of chopping level, points of approximation form change are employed. As an addition to basic approach, controlled violation of approximation rules was considered, not affecting material balance of system.

Maxim Filatov
Lomonosov Moscow State University

Date submitted: 01 Aug 2013 Electronic form version 1.4