

MAXIMUM PRINCIPLE IN MULTIPHASE FLOW PROBLEMS

Konstantin Novikov

Institute of Numerical Mathematics RAS, Moscow, Russia

In multiphase flow models pressure gradient defines phase transport. Therefore it is important to get rid of artificial maximum or minimum in numerical solution for pressure variable as artificial maximum and minimum for pressure variable lead to artificial sources and sinks in numerical solution for saturation variable. To identify numerical extrema value as artificial or natural (i.e. following original continuous solution extrema) it is useful to analyze whether multiphase flow problem solution satisfies maximum principle or not, i.e. is it possible for multiphase flow model solution to reach maximum in internal point of a domain. The talk is devoted to maximum principles for multiphase flow model solutions, both numerical and analytical. First maximum principles for pressure variable for two- and three-phase flow models are presented. Also maximum principle for saturation for two-phase flow model is presented. Then discrete maximum principles are discussed. Analytical discrete maximum principle for finite volume scheme is presented. Numerical experiments support analytical results.