

1147-35-717

Carmen Rodrigo* (carmenr@unizar.es), Applied Mathematics Department, University of Zaragoza, C/Maria de Luna, 3, 50018, Zaragoza, Spain, and **Francisco J Gaspar, Laura Portero** and **Andrés Arrarás**. *Monolithic mixed-dimensional multigrid methods for fluid-flow problems in fractured porous media.*

The numerical simulation of subsurface flow through fractured porous media is a challenging task which is getting increasing attention in recent years. The essential role played by fractures in different applications demands the design of efficient methods for solving the corresponding flow models. In particular, we consider reduced models in which the governing equations comprise a system of mixed-dimensional partial differential equations. In this work, a monolithic multigrid method is proposed for the efficient numerical solution of single-phase flow problems in fractured porous media. Two-dimensional arbitrary fracture networks with vertical and/or horizontal possibly intersecting fractures are considered. The key point in the design of the multigrid solver is to combine two-dimensional multigrid components (smoother and inter-grid transfer operators) in the porous matrix with their one-dimensional counterparts within the fractures, giving rise to a mixed-dimensional multigrid method. Numerical experiments demonstrate the robustness of the monolithic mixed-dimensional multigrid method with respect to the permeability of the fractures, the grid-size and the number of fractures in the network. (Received January 28, 2019)