1077-65-2230 **Guangming Yao*** (yao@rowan.edu), Department of Mathematics, Rowan University, 201 Mullica Hill Road, Glassboro, NJ 08028, and **Joseph Kolibal**, Department of Mathematics, University of Southern Mississippi, 118 College Drive, #5045, Hattiesburg, MS 39406. *Implementing the localized method of approximate particular solutions using a Schultz-Jones-Mayer algorithm.*

The localized method of approximate particular solutions (LMAPS) allows the use of a small neighborhood of points to find the approximate solution of many kinds of PDEs. Furthermore, this approach becomes much more amenable to solving large-scale problems in engineering and the applied sciences. In this approach, only small matrices with the dimension of the number of nodes included in the domain of influence, S_n, have to be inverted for each node. Studies show that there is a marginal improvement in accuracy due to increasing S_n using LMAPS, however, make S_n to large increases computational costs.

On the other hand, LMAPS with inverse multiquadric radial basis functions yields relatively small, dense symmetric matrices, that can be diagonally dominant for suitable shape parameters. After pre-conditioning the eigenvalues of these matrices can be bounded appropriately to allow the Schulz-Jones-Mayer (SJM) algorithm to more efficiently solve these systems in $O(n^2)$ operations, allowing the use of a larger number of points in every local domain.

The improved version of LMAPS has been applied to solve Poisson's problem and modified Helmholtz problem. Computational accuracy and efficiency are compared with LMAPS. (Received September 21, 2011)