1046-14-1873   **Yun Guan*** (`guan@math.uic.edu`), Department of Mathematics, Statistics, and Computer Science, 851 South Morgan (M/C 249), Chicago, IL 60607-7045, and **Jan Verschelde** (`jan@math.uic.edu`), Department of Mathematics, Statistics, and Computer Science, 851 South Morgan (M/C 249), Chicago, IL 60607-7045. *Solving Polynomial Systems on a Parallel Computer with PHCpack and PHClab.*

PHCpack is an open source software package for numerical algebraic geometry. It implements numerical algorithms for solving polynomial systems using homotopy continuation methods. Our MATLAB/Octave package PHClab provides a convenient interface to the functions of PHCpack. With the help of the MPI ToolBox (MPITB) for Octave, we solved a list of polynomial systems on our cluster computer. Another algorithm that runs on our cluster is the diagonal homotopy method for computing the intersection of two algebraic sets. This method is a key ingredient in the subsystem-by-subsystem solver of PHCpack. Our parallel implementation of this solver allows to find numerical representations of all the solution components of large systems more efficiently. Dynamic load balancing leads to an acceptable speedup. (Received September 16, 2008)