**GridPACK v1.1**

**Release Notes**

**Mar 31, 2014**

This release of GridPACK™ contains several new features as well as multiple bug fixes and performance enhancements. Two new applications, illustrating the use of GridPACK components in building power grid simulation codes, are included as well as some additional codes that serve as pedagogical examples of how to use basic GridPACK functionality. The power grid applications include a contingency analysis code that can run multiple instances of the power flow simulation with individual transmission elements or generators eliminated from the calculation and a dynamic simulation code that can be used to evaluate the behavior of a temporary fault in one of the transmission elements.

Two example codes have also been included in this distribution that illustrate some of the features of the GridPACK™ framework without requiring users to master the complexities of a working power grid application. The first is a simple “hello world” code that shows how to create a simple network, initialize buses and branches on the network and use the IO modules to print a message from each bus and branch. The second example is a resistor grid application that solves a simple electric circuit problem for a network of electrical resistors. A current is induced in the system by holding two buses at different voltages. The code solves the corresponding linear electric circuit problem and prints out the potentials on all buses and the currents on all branches. This code adds a few elements beyond the “hello world” problem by showing how to create matrices based on properties of the grid and showing how to create a linear solver.

Besides including new applications and example codes, this release also includes improved communicators that can be used to implement multiple levels of parallelism in applications and a new task manager that can be used to distributed tasks on a first come, first serve basis. The task manager can be combined with the new communicators to implement dynamic load balancing calculations with relatively little effort. Several important bugs and performance issues have also been addressed in this release. The most important relates to how matrices are distributed internally. This bug was causing crashes in matrix-matrix and matrix-vector multiplies due to mismatched data distributions. Removing this bug has resulted in much more robust code for performing algebraic operations. Another significant performance bug has been the partitioner, which has been extremely slow for very large network configurations. Recent improvements have resulted in substantially better performance and reliability. However, issues remain for very large networks on many processors and the partitioning software remains an area of active development.