A Scalable Parallel Symmetric Eigenvalue Problem Solver: TraceMIN

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The trace-minimization scheme ''TraceMIN'' is a robust symmetric eigenvalue problem solver suitable for implementation on a variety of parallel computing platforms. It is capable of obtaining a few of the smallest eigenpairs of the generalized symmetric eigenvalue problem $Ax = \lambda Bx$, e.g. see [1, 2], with a prescribed relative residual in a relatively small number of outer iterations. Although it has been almost three decades since the algorithm was first published, extensive experiments have shown that it is quite robust and compares favorably with respect to speed against more recent eigensolvers, e.g. see [3]. TraceMIN has been recently enhanced with an additional functionality that many eigensolver lack, namely spectral slicing (or multisectioning), in order to obtain a large number of eigenpairs within a prescribed interval in the spectrum. In this presentation, we demonstrate the robustness and the high degree of parallel scalability that TraceMIN possess on both a single multicore node as well as a large cluster of such nodes.

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