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A Banded Spike Algorithm and Solver for Shared Memory Architectures

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Abstract
A new parallel solver based on SPIKE-TA algorithm has been developed using OpenMP API for solving diagonally-dominant banded linear systems on shared memory architectures. The results of the numerical experiments carried out for different test cases demonstrate high-performance and scalability on current multi-core platforms and highlight the time savings that SPIKE-TA OpenMP offers in comparison to the LAPACK BLAS-threaded LU model. By exploiting algorithmic parallelism in addition to threaded implementation, we obtain greater speed-ups in contrast to the threaded versions of sequential algorithms. For non-diagonally dominant systems, we implement the SPIKE-RL scheme and a new Spike-calling-Spike (SCS)

scheme using OpenMP. The timing results for solving the non-diagonally dominant systems using SPIKE-RL show extremely good scaling in comparison to LAPACK and modified banded-primitive library.

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