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## Implementation of Parallel 3-D Real FFT with 2-D Decomposition on Intel Xeon Phi Clusters

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In this paper, we propose an implementation of a parallel 3-D real fast Fourier transform (FFT) with 2-D decomposition on Intel Xeon Phi clusters. The proposed implementation of the parallel 3-D real FFT is based on the conjugate symmetry property of the discrete Fourier transform (DFT) and the row-column FFT algorithm. We vectorized FFT kernels using the Intel Advanced Vector Extensions 512 (Intel AVX-512) instructions. Performance results of parallel 3-D real FFTs on Intel Xeon Phi clusters are reported. We successfully achieved a level of performance over 10 TFlops on 2048 nodes of Fujitsu PRIMERGY CX1640 M1 cluster for an  $8192^3$ -point FFT.

**Keywords:** Fast Fourier transform, 2-D decomposition, Intel Xeon Phi clusters