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lei wang* (lwang@mcs.anl.gov), 9700 S. Cass Ave., Argonne, IL 60439, and **jie chen** (jiechen@mcs.anl.gov), 9700 S. Cass Ave., Argonne, IL 60439. *Fast Evaluating Matern Covariance Kernel by a Cartesian Treecode.*

Evaluating sums of multivariate Matern kernels is a common computational task in statistical and machine learning community. The quadratic computational complexity of the summation is a significant barrier to practical applications. We develop a Cartesian treecode algorithm to efficiently estimate sums of the Matern Kernel. The method uses a far-field Taylor expansion in Cartesian coordinates to compute particle-cluster interactions. The Taylor coefficients are obtained by recurrence relations which allows efficient computation of high order approximations. In the serial code, for a given order of accuracy, the treecode CPU time scales as $O(N \log N)$ and the memory usage scales as $O(N)$, where N is the number of particles. Parallel code also gives promising scale. (Received September 05, 2012)