

## Parallel Computation of the Covariance-Matrix

**Authors :** Claude Tadonki

**Abstract :** We address the issues related to the computation of the covariance matrix. This matrix is likely to be ill conditioned following its canonical expression, thus consequently raises serious numerical issues. The underlying linear system, which therefore should be solved by means of iterative approaches, becomes computationally challenging. A huge number of iterations is expected in order to reach an acceptable level of convergence, necessary to meet the required accuracy of the computation. In addition, this linear system needs to be solved at each iteration following the general form of the covariance matrix. Putting all together, it comes that we need to compute as fast as possible the associated matrix-vector product. This is our purpose in the work, where we consider and discuss skillful formulations of the problem, then propose a parallel implementation of the matrix-vector product involved. Numerical and performance oriented discussions are provided based on experimental evaluations.

**Keywords :** covariance-matrix, multicore, numerical computing, parallel computing

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