Randomization techniques for solving linear systems of equations and eigenvalue problems

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In this talk we discuss recent progress in using randomization for solving linear systems of equations and eigenvalue problems. We present a randomized version of the Gram-Schmidt process for orthogonalizing a set of vectors and its usage in the Arnoldi iteration. This leads to introducing new Krylov subspace methods for solving large scale linear systems of equations and eigenvalue problems. The new methods retain the numerical stability of classic Krylov methods while reducing communication and being more efficient on modern massively parallel computers.

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