THE UNIVERSITY OF CHICAGO

COMPUTATIONAL AND APPLIED MATHEMATICS COLLOQUIUM

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Adaptive Iterative Methods for Linear Systems

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Via ZOOM

ABSTRACT

Iterative solvers for linear systems are often the workhorse for many difficult computational problems ranging from computed tomography to optimal control. While such classical iterative solvers as CG and GMRES still dominate the landscape, row-action and column-action iterative solvers are garnering interest owing to their simplicity, low per-iteration costs, and ease of integrating randomization into their core calculations. Unfortunately, vanilla forms of these row-action and column-action iterative methods are often inefficient for most problem structures and hardware configurations. As a natural recourse, adaptive variants of these methods---tailored to unique problem contexts---are being explored. But, are these unique adaptive variants guaranteed to converge? Heretofore, each unique adaptive variant has required its own analysis to establish convergence and corresponding rates. In this talk, we distill a set of generic conditions that characterize an interesting set of (deterministic and randomized) adaptive methods; then, for a method satisfying these conditions, we prove a single result that establishes convergence and a rate-of-convergence. We will show that a number of adaptive methods in the literature satisfy our generic conditions, and, thus, our convergence result. If time remains, we will present some hypothetical yet plausible adaptive methods that are well-suited to certain problem contexts.

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