**TEMPLE UNIVERSITY**
Department of Mathematics

# Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall
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## On the convergence of Algebraic Optimizable Schwarz Methods with applications to elliptic problems

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**Abstract.** Domain decomposition methods are iterative methods for numerically solving boundary value problems in parallel. The Schwarz iteration uses an overlapping decomposition $\Omega = \Omega_1 \cup ... \cup \Omega_p$ of the domain $\Omega$ and solves a Dirichlet problem on each subdomain $\Omega_j$. Because the subdomains $\Omega_j$ are smaller than the domain $\Omega$, the finite dimensional matrix problems resulting from the discretization of the Dirichlet problems are smaller than the original problem, and each subproblem can be solved on a separate processor. Optimized Schwarz methods replace the Dirichlet conditions on the subdomains by Robin conditions, whose Robin parameter $\alpha$ is optimized for fastest possible convergence. In this talk, we will give an algebraic formulation of these methods for $p = 2$ subdomains and provide a criterion for convergence. As an application to elliptic boundary value problems, we show that the Optimized Schwarz methods with Robin transmission conditions converge for any $\alpha > 0$, when there are $p = 2$ subdomains and when the overlap is "relatively uniform". We will also discuss some numerical experiments with $p = 2$ and $p = 12$ subdomains.