THE UNIVERSITY OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

Numerical Analysis Seminar

Non-overlapping spectral additive Schwarz methods

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Abstract

Domain decomposition methods are one of the most important techniques commonly used in parallel computation. The basic idea is to divide the solution of a large linear system into smaller problems whose solutions can be used to produce a preconditioner for the system of equations that results from discretizing the PED on the entire domain.

Non-overlapping spectral additive Schwarz methods (NOSAS) were introduced as domain decomposition preconditioners for solving 2D and 3D elliptic problems with highly heterogeneous coefficients inside each subdomain. NOSAS are two-level additive Schwarz methods with coarse space constructed by the local eigenfunctions generated by each local generalized eigenvalue problem. Local problem and local generalized eigenvalue problem use only non-overlapping subdomains and the subdomain iteration is via the coarse space. NOSAS methods have good parallelization properties. The condition number of NOSAS is independent of coefficients and only associated with the local eigenfunctions quantified by a threshold. Also, the global interaction of the coarse problem is associated with the total number of all local eigenfunctions. In this talk, we design and analyze NOSAS in conforming and nonconforming finite elements discretization. Also, we develop a three-level extension of NOSAS, aiming to reduce the complexity of the global problem. Finally, we consider an economic version of local generalized eigenvalue problem, aiming to reduce the complexity of each local generalized eigenvalue problem.

Date:	September 21, 2021 (Tuesday)
Time:	4:00 – 5:00pm (Hong Kong Time)
Venue:	Room 210, Run Run Shaw Bldg., HKU and ZOOM: https://hku.zoom.us/j/ Meeting ID: 913 6532 3891 Password: 310656

All are welcome