

Spectral Coarse Spaces in Domain Decomposition Methods and Multiscale Discretizations

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Abstract

Coarse spaces are an essential ingredient in the development of domain decomposition methods. They are specifically designed to ensure numerical scalability, which is a necessary condition for parallel scalability. Therefore, they are important for good parallel performance for large numbers of subdomains and parallel processes. Moreover, they provide robustness with respect to the physical parameters in the case of heterogeneous problems. In the past decade, a new type of methods has been extensively studied, that is, domain decomposition preconditioners which use coarse space corrections based on solutions of eigenvalue problems; these coarse spaces are also called spectral or adaptive coarse spaces. There is a strong link with multiscale discretizations, where similar basis functions can be used to reconstruct the solution on a coarse geometrical grid. This mini-symposium gathers recent contributions both on domain decomposition preconditioners with spectral coarse spaces and multiscale discretizations as well as the connections between them: the exchanges between the two communities can lead to new ideas that could improve the state of the art in the two fields.

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