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Accommodating Irregular Subdomains in Domain Decomposition Theory

In the theory for domain decomposition methods, we have previously often assumed that each subdomain is the union of a small set of coarse shape-regular triangles or tetrahedra. In this talk, we discuss recent progress which makes it possible to analyze cases with irregular subdomains such as those provided by mesh partitioners.

Our goal is to extend our analytic tools to problems on subdomains that might not even be Lipschitz and to characterize the rates of convergence of our methods in terms of a few, easy to understand, geometric parameters of the subregions. For two dimensions, we have already obtained some best possible results for scalar elliptic and linear elasticity problems: the subdomains should be John or Jones domains and the rate of convergence is determined using the parameters that define such domains and that of an isoperametric inequality. Progress on three dimensions will also be reported. (Received March 09, 2009)