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Towards flexible geometric multigrid solvers for finite element problems.

Multigrid methods have the attractive potential of solving systems arising from the finite element method in optimal time. However, applying multigrid methods to arbitrary problems requires being able to effectively separate the scales of the problem in such a way that the needs of both multigrid and the quality of the finite element solution are satisfied. Efficient topologically-motivated and dimension-independent techniques for creating hierarchies of meshes satisfying both these concerns will be discussed. (Received February 12, 2008)