Finite Element Regularity on Combinatorial Manifolds without Boundary

Abstract:
The Finite Element Method in its most simple form considers piecewise polynomials on a triangulated space $\Omega$. While the general theory does not require structure on $\Omega$ beyond admitting a finite triangulation, it is quickly realized that in order to solve partial differential equations, $\Omega$ must be endowed with a differentiable structure. We introduce a new framework which has the potential to allow the Finite Element Method access to a broad class of differentiable manifolds of non-trivial topology.