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**Matthew G Knepley** (knepley@gmail.com), Argonne National Lab, Mathematics and Computer Science Division, 9700 S. Cass Avenue, Argonne, 60439, and **Andy R Terrel\*** (aterrel@uchicago.edu), Department of Computer Science, University of Chicago, 1100 58th St, Chicago, IL 60637. *Finite Element Assembly on Arbitrary Meshes*. Preliminary report.

One goal of automating Finite Element Methods (FEM) is to allow arbitrary element types and orders on arbitrary meshes. A challenge to this goal is separating local element definitions from the mesh definition. We show our conceptual paradigm for this separation using the PETSc Sieve library, a library based on representing meshes as Grothendieck topologies. (Received February 11, 2008)