

Parallel Unstructured Mesh Infrastructure

Parallel management and adaptation of unstructured meshes. Interoperable components to support the development of unstructured mesh simulation workflows

Core functionality

- Distributed, conformant mesh with entity migration, remote read only copies, fields and their operations
- Link to the geometry and attributes
- Mesh adaptation (straight and curved), mesh motion
- Multi-criteria partition improvement
- Distributed mesh support for Particle In Cell methods

In-memory integrations developed

- MFEM: High order FE framework
- PetraM: Adaptive RF fusion
- PHASTA: FE for turbulent flows
- FUN3D: FV CFD
- Proteus: Multiphase FE
- ACE3P: High order FE for EM
- M3D-C1: FE based MHD
- Nektar++: High order FE for flow
- Albany/Trilinos: Multi-physics FE

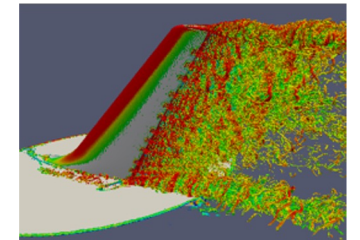
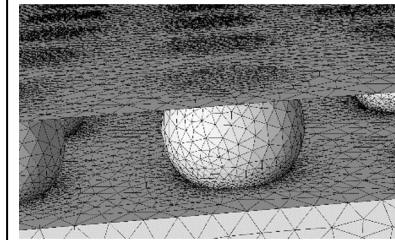
Designed for integration into existing codes

- xSDK package; installs with Slack
- Permissive license enables integration with open and closed-source codes

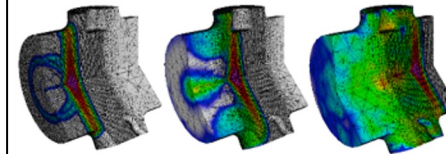
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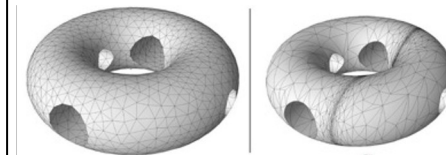
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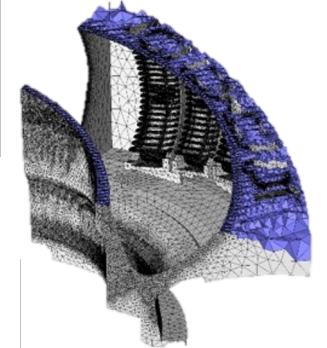
Applications with billions of elements: flip-chip (L), flow control (R)



Mesh adaptation for evolving features



Anisotropic adaptation for curved meshes



RF antenna and plasma surface in vessel.

Source Code: github.com/SCOREC/core
User Guide: scorec.rpi.edu/pumi/PUMI.pdf
Paper: scorec.rpi.edu/REPORTS/2014-9.pdf