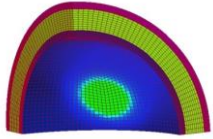



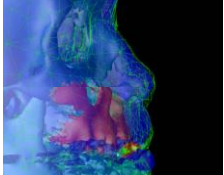
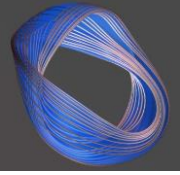
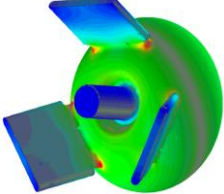


Highly scalable multilevel solvers and preconditioners. Unique user-friendly interfaces. Flexible software design. Used in a variety of applications. Freely available.

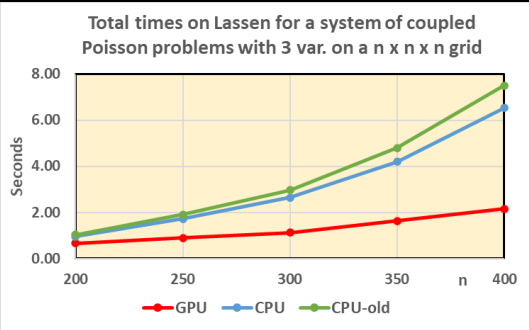
- **Conceptual interfaces**
 - Structured, semi-structured, finite elements, linear algebraic interfaces
 - Provide natural “views” of the linear system
 - Provide for efficient (scalable) linear solvers through effective data storage schemes
- **Scalable preconditioners and solvers**
 - Structured and unstructured algebraic multigrid solvers
 - Maxwell solvers, H-div solvers
 - Multigrid solvers for nonsymmetric systems: pAIR
 - Multigrid reduction (MGR) for systems of PDEs
 - Matrix-free Krylov solvers
 - ILU and FSAI preconditioners
- **Exascale early systems GPU-readiness**
 - Nvidia GPU (CUDA), AMD GPU (HIP), Intel GPU (SYCL)
- **Open-source software**
 - Used worldwide in a vast range of applications
 - Can be used through PETSc and Trilinos
 - Available on github: <https://www.github.com/hypre-space/hypre>








Elasticity / Plasticity



Electro-magnetics Magneto-hydrodynamics Facial surgery



n	GPU (Seconds)	CPU (Seconds)	CPU-old (Seconds)
200	~0.5	~1.0	~1.5
250	~0.8	~1.8	~2.5
300	~1.2	~3.0	~4.0
350	~1.8	~4.5	~6.0
400	~2.5	~6.5	~8.0



<http://www.llnl.gov/CASC/hypre>