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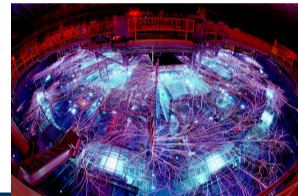
Trilinos solver updates

Christian Glusa, caglusa@sandia.gov

Solver work in FY23 / FY24

■ Amesos2

  Updates to STRUMPACK, SuperLU_DIST, MUMPS and LAPACK adapters

■ Belos & Anasazi

Switzer, Boman, Loe — Randomized eigensolver
Thornquist, NGA — Improved testing with Tpetra
Dang, Loe — Extend GCRO-DR linear solver to use Kokkos linear algebra for GEMMA
Loe, Thornquist — WIP: Integration of serial dense matrix traits in Belos to enable use of Teuchos/Kokkos objects

■ Ifpack2

Phillips — 4th kind Chebyshev smoother
Liegeois — Algorithmic and performance improvements for BlockTriDiag and BlockJacobi.
  WIP: Schur complement approach
Dang — Stream based RILU(k) and triangular solves
Ransegnola — Optimize Kokkos Kernels MDF ILU(0) solver and expose it in Ifpack2
Harper — Patch solver with data compression
Foucar — Upcoming: block version of traditional ILU(0)

- **MueLu**
  - Siefert, Tuminaro — Better ML/MueLu compatibility (parameter translation, aggregation algorithms, ..)
  - Siefert, Tuminaro — Reitzinger-Schöberl type multigrid for Maxwell problems
  - Siefert — BlockCRS support
  - Berger-Vergiat, Hu, Ren — Improved setup performance on device (TAFC Tpetra changes)
  - Glusa — Reformulated Darcy solver
  - Glusa — Matrix-free multigrid with user-specified operators
  - Glusa — AMG for hierarchical matrices
  - Glusa, Harper — WIP: Refactor of host-only and Kokkos code paths
  - Harper, Mayr — WIP: MueLu tutorial overhaul
  - Harper — Upcoming: Matrix-free AMG
- **NOX**
  - Ober, Pawlowski — Refactored internal use of model evaluators
  - Pawlowski — LOCA Householder constraint solver can now be nested within a Tempus transient problem (Tpetra version)
- **ShyLU**
  - Foucar — FastILU algorithmic improvements and testing, new block version
  - Ellingwood — Transpose solve with Basker
  - Yamazaki — Tacho: runs with HIP. WIP: performance for solves on streams
- **ShyLU/FROSch** (→ **Talk by Alexander Heinlein on Wednesday**)
  - Heinlein, Roever — fully recursive multi-level implementation
  - Heinlein, Sassmannshausen — monolithic coarse spaces via partition-of-unity approach
  - Yamazaki, Heinlein — GPU capabilities
- **Stratimikos**
  - Glusa, Loe, Yamazaki — Use of half precision preconditioners (Ifpack2, MueLu, ShyLU/FROSch)
- **Teko**
  - NGA, Pawlowski — Epetra dependency is now optional