

Scalable Library for Eigenvalue Problem Computations. Parallel solvers for linear and nonlinear eigenproblems. Also functionality for matrix functions.

Linear eigenvalue problems and SVD

- Standard and generalized eigenproblem, $Ax=\lambda x$, $Ax=\lambda Bx$; singular values $Au=\sigma v$
- Easy selection of target eigenvalues, shift-and-invert available for interior ones
- Many solvers: Krylov, Davidson, LOBPCG, contour integral, ...

Nonlinear eigenvalue problems



- Polynomial eigenproblem $P(\lambda)x=0$, for quadratic or higher-degree polynomials
- Solvers: Krylov with compact basis representation; Jacobi-Davidson
- General nonlinear eigenproblem $T(\lambda)x=0$, for any nonlinear function incl. rational

Matrix functions

- Parallel Krylov solver to evaluate $y=f(A)v$
- Support for matrix exponential, square root, etc. and combinations thereof

Extension of PETSc

- Runtime customization, portability and performance, C/C++/Fortran/python
- Can use any PETSc linear solvers and preconditioners

Nonlinear Eigensolver						M. Function	
SLP	RII	N-Arnoldi	Interp.	CISS	NLEIGS	Krylov	Expokit

Polynomial Eigensolver				SVD Solver		
TOAR	Q-Arnoldi	Linearization	JD	Cross Product	Cyclic Matrix	Thick R. Lanczos

Linear Eigensolver						
Krylov-Schur	Subspace	GD	JD	LOBPCG	CISS	...

