

SLEPc

Scalable Library for Eigenvalue Problem Computations

Description

SLEPc, the Scalable Library for Eigenvalue Problem Computations, is a software library for the solution of large, sparse eigenvalue problems on parallel computers. It can be used for problems formulated in either standard or generalized form, both Hermitian and non-Hermitian, with either real or complex arithmetic, as well as other related problems such as the singular value decomposition (SVD) or the polynomial eigenvalue problem (PEP).

SLEPc focuses on sparse problems, such as those arising from the discretization of partial differential equations. Several eigensolvers are available, including Krylov-Schur and Jacobi-Davidson. SLEPc also provides built-in support for different types of problems and spectral transformations such as shift-and-invert.

SVD Solver			Polynomial Eigensolver			
Cross Product	Cyclic Matrix	Thick R. Lanczos	TOAR	Linearization	Q-Arnoldi	
Linear Eigensolver						
Krylov-Schur	Arnoldi	Lanczos	GD	JD	RQCG	CISS
Spectral Transformation						
Shift	Shift-and-invert	Cayley	Preconditioner			

Numerical components of SLEPc.

SLEPc is built on top of PETSc (Portable, Extensible Toolkit for Scientific Computation, www.mcs.anl.gov/petsc) and extends it with all the functionality necessary for the solution of eigenvalue problems.

SLEPc also leverages well-established eigensolver packages such as ARPACK, PRIMME, BLZPACK, TRLAN, and BLOPEX, integrating them seamlessly.

Highlights

- Easy programming in PETSc's object-oriented style
- Data-structure neutral implementation
- Run-time flexibility, giving full control over the solution process
- Portability to a wide range of parallel platforms
- Usable from code written in C, C++ and Fortran
- Extensive documentation

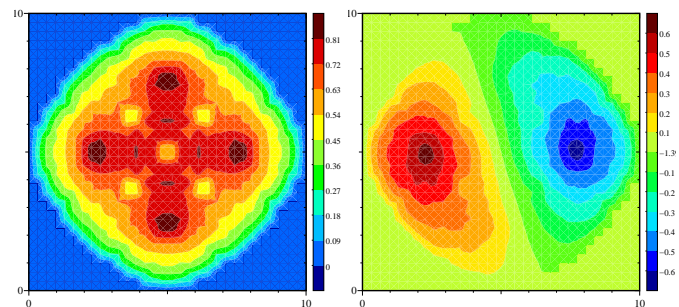
Parallel Solution of Large-scale Sparse Eigenvalue Problems

$$Ax = \lambda x \quad Ax = \lambda Bx \quad Av = \sigma u$$

Applications

SLEPc is currently being used in numerous applications from different areas, including:

- Neutron diffusion and transport
- Computational electromagnetics
- Computational chemistry and materials science
- Plasma physics
- Acoustics
- Flow stability and bifurcation analysis
- Statistics and information retrieval
- Model reduction



Dominant modes of the power distribution inside a nuclear reactor

Contact Information

Availability

The SLEPc distribution file can be obtained through the SLEPc web site. The documentation includes a users guide, manual pages, and a collection of examples. SLEPc is supported via e-mail at slepc-maint@upv.es.

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Web Site

<http://slepc.upv.es>



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