A Set of Fortran 90 and Python Routines for Solving Linear Equations with IDR(s)

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Some IDR facts

- IDR(s) is a Krylov subspace method designed for solving large-scale linear systems of the form
  \[ Ax = b, \quad A \in \mathbb{C}^{N \times N}. \]
- Based on \((s + 2)\)-term recursion: limited memory method.
- No restrictive assumptions on system matrix \(A\).
- Finite termination after \(N + N/s\) matrix-vector products.

IDR(s) for linear matrix equations

\[
\sum_{j=1}^{k} A_j X B_j^T = C, \quad \text{and} \quad \begin{cases} \quad Ax = b \quad \text{A}^T \hat{x} = \hat{b} \end{cases}
\]


IDR(s) for shifted linear systems

\[(A - \sigma_j I)x_j = b, \quad j = 1, 2, \ldots\]


New code design

Recently developed IDR version:
- flexible user interface via types
- available for download in many languages