AIM OF THIS PAPER

* Exposition of basic theoretical facts about and relations among:
  - Lanczos tridiagonalization: $BO$ alg., "BC alg" = $BO(A)$
  - Lanczos bidiagonalization: "BOBC alg."
  - LR transf. for tridiag. matrices: $qd$ alg.
  - Application to solving linear systems:
    - $BO \rightarrow BI\text{ORES} <_{\text{normalized}} \text{Lanczos/ORTHORES}$
    - $BOBC \rightarrow BI\text{OHIN} <_{\text{norm.}} = BCG = \text{Lanczos/ORTHOHIN}$
    - $BC \rightarrow BI\text{ODIR} <_{\text{unnorm.}} = \text{Lanczos/ORTHODIR}$
  - Breakdown conditions for these algorithms
  - Formal orthogonal polynomials and Padé approximation
  - Continued fractions
  - (Bi)conjugate squared algorithms:
    - $BO \rightarrow BI\text{ORES}^2 <_{\text{normalized}} \text{UNnormalized}$
    - $BOBC \rightarrow BI\text{OHIN}^2 = CGS$
    - $BC \rightarrow BI\text{ODIR}^2 (2\text{ versions})$
  - Fast Hankel solvers

* Emphasis is on theoretical relationships, not numerical properties or implementation.
* Preparation for "A completed theory of the unsymmetric Lanczos process and related algorithms," which treats the nongeneric situations and allows us, e.g., to overcome a "curable serious breakdown" of the $BO$ algorithm: nongeneric $BO$ alg,..., nongeneric $qd,$...

Others involved in nongeneric case: Gragg '74, Draxl '83, Parlett/Taylor/Lei '85, Golub/G. '89, Joubert, Parlett, Bolley.