

BREAKDOWNS AND NEAR BREAKDOWNS IN SYMPLECTIC REDUCTIONS OF A MATRIX TO UPPER J -HESSENBERG FORM

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The algorithm JHESS, or the recent JHMSH algorithm and its variants, are based on symplectic similarity transformations for reducing a matrix to an upper J -Hessenberg form. This reduction is a crucial step in the SR -algorithm (which is a QR -like algorithm), structure-preserving, for computing eigenvalues and vectors, of a class of structured matrices.

Unlike its equivalent in the Euclidean case, these algorithms may meet fatal breakdowns, causing brutal stops of the computations or encounter near-breakdowns, which are source of serious numerical instability.

In this talk, we point out where such breakdowns or near-breakdowns occur and present efficient strategies for curing them. The effectiveness of such strategies are illustrated by numerical experiments.

References

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