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Correspondence

Counter-example to a recent result on the Schur stability of interval matrices by C.-l. Jiang

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Jiang (1988) stated that the Schur stability of an interval matrix A_I is equivalent to that of the vertices of A_I. We point out, via a counter-example, that this result is incorrect.

Jiang (1988) stated that the Schur stability of an interval matrix A_I is equivalent to that of the vertices of A_I. In this correspondence, we point out via a counter-example created using an example from Cieslik (1987) that this result is incorrect.

Using the notation in Jiang (1988), our interval matrix is given by

$$A_I = \{\alpha B_1 + (1-\alpha)B_2 : 0 \leqslant \alpha \leqslant 1\}$$

where

$$B_1 = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1/2 & -1/2 & -109/288 & 0 \end{bmatrix}$$

and

$$B_2 = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1/2 & -1/2 & -109/288 & 1 \end{bmatrix}$$

It is computed that the eigenvalues of B_1 are given by $0{\cdot}9967 \angle 80{\cdot}35^\circ$, $0{\cdot}9967 \angle -80{\cdot}35^\circ$, $-0{\cdot}8959$, and $0{\cdot}5618$, and the eigenvalues of B_2 are given by $0{\cdot}9475 \angle 59{\cdot}54^\circ$, $0{\cdot}9475 \angle -59{\cdot}54^\circ$, $0{\cdot}7661$, and $0{\cdot}7270$. Therefore, B_1 and B_2 are Schur stable. However, $\alpha B_1 + (1-\alpha)B_2$ with $\alpha = 0{\cdot}25$ is not Schur stable because one of its eigenvalues is found to be $1{\cdot}001 \angle 75{\cdot}54^\circ$. This contradicts the results of both Theorems 1 and 2 given by Jiang (1988).

References

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