Comments on “Necessary and Sufficient Conditions for the Hurwitz and Schur Stability of Interval Matrices”

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Abstract—This note shows that Example 1 in the above paper is not Hurwitz stable.

Recently, Wang et al. derived some new sufficient and necessary conditions for the Hurwitz and Schur stability of interval matrices. Based on these results, they developed an elegant algorithm to determine the Hurwitz and Schur stability properties of interval matrices. In this note, we show that their Example 1 is not Hurwitz stable.

Example 1: Wang et al. claim that the interval matrix $[A^m \ A^M]$ where

$$
A^m = \begin{bmatrix}
-3 & 4 & 4 & -1 \\
-4 & -4 & -4 & 1 \\
-1 & 2 & -5 & -1 \\
0 & 0 & 1 & -4
\end{bmatrix}
$$

and

$$
A^M = \begin{bmatrix}
-2 & 5 & 6 & 1.5 \\
-3 & -3 & -3 & 2 \\
-4 & 3 & -4 & 0 \\
0.1 & 1 & 2 & 2.5
\end{bmatrix}
$$

is Hurwitz stable. If we choose, however, a matrix in $[A^m \ A^M]$ as

$$
A = \begin{bmatrix}
-2.5 & 4.5 & 5 & 0.25 \\
-3.5 & -3.5 & -3.5 & 1.5 \\
-4.5 & 2.5 & -4.5 & -0.5 \\
-0.45 & 0.5 & 1.5 & 0.875
\end{bmatrix}
$$

then it is seen that matrix $A$ with the eigenvalues at 0.6696, -2.7173, and -3.7887 ± j6.7546 is unstable. Therefore the conclusion of Wang et al. is incorrect.

Correction to “Necessary and Sufficient Conditions for the Hurwitz and Schur Stability of Interval Matrices”

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In the above paper, Example 1, the last entry in matrix $A^M$ should be -2.5 instead of 2.5. This is a typographical error and in no way does it alter the validity of the results.

Manuscript received August 9, 1995.
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Manuscript received February 21, 1995.
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Publisher Item Identifier S 0018-9286(96)00390-X.