

## Correspondence

### Comments on 'A necessary and sufficient condition for the positive-definiteness of interval symmetric matrices'

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Shi and Gao (1986) gave a necessary and sufficient condition for the positive-definiteness of interval symmetric matrices. We point out that their result is not new and the assumptions can be less restrictive.

Shi and Gao (1986) gave a necessary and sufficient condition for the positive-definiteness of interval symmetric matrices. The main result is that the positive-definiteness of an interval symmetric matrix is guaranteed by the positive-definiteness of its vertices. In this correspondence, we shall point out that this result is not new and that the assumptions can be less restrictive.

It is well known that the sum of positive-definite matrices and positive-semi-definite matrices is positive-definite. With  $\mathbf{L}[P, Q]$  denoting an interval symmetric matrix and  $\mathbf{K}[P, Q]$  denoting the set of vertices of  $\mathbf{L}[P, Q]$ , every element  $A \in \mathbf{L}[P, Q]$  can be written as

$$A = \sum_{i=1}^k \lambda_i S_i, \quad \sum_{i=1}^k \lambda_i = 1, \quad \lambda_i \geq 0, \quad i = 1, 2, \dots, k$$

where  $S_i, i = 1, 2, \dots, k$  are elements of  $\mathbf{K}[P, Q]$ . Hence, the positive-definiteness of  $S_i$  implies the positive-definiteness of  $A$ .

It is easy to see that the conclusion that the positive-definiteness of the vertices implies the positive-definiteness of the interior also holds for general polytopes of matrices, and the vertex matrices do not necessarily have to be symmetric.

#### REFERENCE

SHI, Z.-C., and GAO, W.-B., 1986, *Int. J. Control*, **43**, 325.

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