Stability of linear interval discrete systems with delay and convergence of its solutions

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This investigation is a joint work with Josef Diblík (Brno University of Technology, Czech Republic), Denys Khusainov (Kiev National University, Ukraine) and Andrii Sirenko (Kiev National University, Ukraine).

Consider the so-called linear interval difference systems with delay

$$x\left(k+1\right)=\left(A+\Delta A(k)\right)x\left(k\right)+\left(B+\Delta B(k)\right)x\left(k-m\right),\quad k=1,2,\ldots \quad (1)$$

Where A, B are constant matrices, $\Delta A(k)=\{\Delta a_{ij}(k)\}$, $\Delta B=\{\Delta b_{ij}(k)\}$ $\quad i,j=1,2,\ldots,n$ are matrices whose coefficients can take their values from some pre-assigned intervals

$$|\Delta a_{ij}(k)|\leq\alpha_{ij},\quad |\Delta b_{ij}(k)|\leq\beta_{ij},\quad i,j=1,2,\ldots,n,$$

and $\alpha_{ij}\geq 0$, $\beta_{ij}\geq 0$ are constants.

We formulate a definition of interval stability and give sufficient conditions guaranteeing interval stability of the system (1). Estimation of convergence of solutions is derived as well.