

# Application of the Computer Algebra System in Investigation of D-Stability of Matrices

L.A. Burlakova

Lab. Stability of Motion

Institute of Systems Dynamics and Control Theory SB

Russian Academy of Sciences

Irkutsk, Russia

## **Abstract**

Algorithms for investigation of quadratic matrices, which possess the property of D-stability, are discussed. In the general case, it is impossible to write down constructive (i.e. verifiable within a finite number of steps) D-stability conditions; different authors have obtained only some necessary and some sufficient conditions. Necessary and sufficient D-stability conditions for the 2nd and 3rd order matrices have been known long ago. The problem of necessary and sufficient D-stability conditions for 4th order matrices has not been solved completely: likewise in the general case, some necessary and some sufficient conditions are known. Our paper discusses other necessary D-stability conditions for the 4th order matrices, which are expressed via matrix elements. It is shown that these conditions are necessary and sufficient for the matrices of some definite type. Examples of parametric analysis of matrices are given; the results give evidence of closeness of the proposed necessary conditions to the sufficient ones.