

عنوان مقاله:

NEW MODELS AND ALGORITHMS FOR SOLUTIONS OF SINGLE-SIGNED FULLY FUZZY LR LINEAR SYSTEMS

محل انتشار:

مجله سیستم های فازی، دوره 9، شماره 3 (سال: 1391)

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خلاصه مقاله:

We present a model and propose an approach to compute an approximate solution of Fully Fuzzy Linear System (FFLS) of equations in which all the components of the coefficient matrix are either nonnegative or nonpositive. First, in discussing an FFLS with a nonnegative coefficient matrix, we consider an equivalent FFLS by using an appropriate permutation to simplify fuzzy multiplications. To solve the m times n permuted system, we convert it to three m times n real linear systems, one being concerned with the cores and the other two being related to the left and right spreads. To decide whether the core system is consistent or not, we use the modified Huang algorithm of the class of ABS methods. If the core system is inconsistent, an appropriate unconstrained least squares problem is solved for an approximate solution. The sign of each component of the solution is decided by the sign of its core. Also, to know whether the left and right spread systems are consistent or not, we apply the modified Huang algorithm again. Appropriate constrained least squares problems are solved, when the spread systems are inconsistent or do not satisfy fuzziness conditions. Then, we consider the FFLS with a mixed single-signed coefficient matrix, in which each component of the coefficient matrix is either nonnegative or nonpositive. In this case, we break the m times n coefficient matrix up to two m times n matrices, one having only nonnegative and the other having only nonpositive components, such that their sum yields the original coefficient matrix. Using the distributive law, we convert each m times n FFLS into two real linear systems where the first one is related to the cores with size m times n and the other is γm times γn and is related to the spreads. Here, we also use the modified Huang algorithm to decide whether these systems are consistent or not. If the first system is inconsistent or the second system does not satisfy the fuzziness conditions, we find an approximate solution by solving a respective least squares problem. We summarize the proposed approach by presenting two computational algorithms. Finally, the algorithms are implemented and effectively tested by solving various randomly generated consistent as well as inconsistent numerical test problems.

کلمات کلیدی:

LR fuzzy numbers, Single-signed fuzzy numbers, Fully fuzzy linear systems, ABS algorithms, Least squares problems

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