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ABSTRACT

EIGENVALUE BASED MODEL ORDER REDUCTION

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In this work, model order reduction techniques which has an increasing importance especially in Very Large Scale Integrated(VLSI) circuit interconnection design and simulation, are analysed. A new method based on eigenvalues of the coefficient matrices is developed.In suggested method, Gerschgorin Theorem is employed to obtain some information about the eigenvalue distribution of the system. Then, if the Gerschgorin discs of the matrices are grouped in different locations of the complex plane, the group which is closer to the jw axes is selected to build a reduced system. But if all Gerschgorin discs are overlapped in complex plane, invariant subspaces can be composed which has the same eigenvalues with the coefficient matrices of the system in selected region of complex plane (slides, discs, etc.). To do this, matrix sign function or Malyshev iteration can be employed. These methods can be used in one-step algorithm. But it is also possible to use it in an iteration. One can select a suitable geometrical shape (discs, etc.) and change the dimension of the shape until the fault tolerance is satisfied.

Keywords: Model Reduction, Applied Linear Algebra, Eigenvalue Problem

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