

Model Order Reduction of Continuous LTI Large Descriptor System Using LRCF-ADI and Square Root Balanced Truncation

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Abstract : In this paper, we analyze a linear time invariant (LTI) descriptor system of large dimension. Since these systems are difficult to simulate, compute and store, we attempt to reduce this large system using Low Rank Cholesky Factorized Alternating Directions Implicit (LRCF-ADI) iteration followed by Square Root Balanced Truncation. LRCF-ADI solves the dual Lyapunov equations of the large system and gives low-rank Cholesky factors of the gramians as the solution. Using these cholesky factors, we compute the Hankel singular values via singular value decomposition. Later, implementing square root balanced truncation, the reduced system is obtained. The bode plots of original and lower order systems are used to show that the magnitude and phase responses are same for both the systems.

Keywords : low-rank cholesky factor alternating directions implicit iteration, LTI Descriptor system, Lyapunov equations, Square-root balanced truncation

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