

EFFICIENT CROSS-GRAMIAN-BASED STATE AND PARAMETER REDUCTION

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Evaluation of large-scale parametrized control systems poses a complex computational task. The cross-gramian is a very versatile tool to evaluate the input-output behaviour of control systems, hence allowing a reduction of the corresponding state-space while affecting the dynamics marginally. By treating the parameters as additional, yet constant, states of the underlying control system, the cross gramian of such augmented system allows furthermore an identification, and thus reduction, of the associated parameter-space [1]. A swift computation of the cross gramian can be achieved by using the empirical-gramian approach, which assembles the cross gramian purely from perturbed simulations without requiring the solution of a sylvester-equation. Various variants [2, 3] of the (empirical) cross-gramian for linear and also nonlinear control systems are discussed and benchmarked for state-space, parameter-space and combined state- and parameter-space reduction.

REFERENCES

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