

Model reduction for nonlinear systems

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The model reduction problem can be simply, and informally, posed as follows. Given a system, described by means of linear or nonlinear differential equations together with an output map, compute a simpler system which approximates (in a sense to be specified) its behavior. This problem has great importance in applications, because reduced order models are often used in analysis and design.

In this contribution the problem of model reduction for nonlinear systems exploiting the notion of moments is discussed. In particular we define the notion of moment for nonlinear systems and discuss how this notion can be exploited to construct parameterized families of reduced order models.

We also discuss the difficulties associated with the definition of moments for switched, hybrid and cyber-physical systems, and provide some initial guidelines on this problem.

The contribution is essentially based on the results in [?], and subsequent developments.

References

- [1] A. Astolfi. Model reduction by moment matching for linear and nonlinear systems. *IEEE Trans. Autom. Control*, 55:2321–2336, 2010.

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