

PARAMETRIC MODEL ORDER REDUCTION

– obtaining concise mathematical models that work.

Large scale systems are present in many fields of engineering and for many applications, such as circuit simulation and time dependent control problems. In large systems, the system dimension or number of internal state space variables is quite large, with respect to the number of input and output ports. When the system dimension is large, the underlying mathematical model becomes computationally intractable, due to memory insufficiency, time limitations and ill-conditioning. The common approach to overcome this is by means of model order reduction. The resulting reduced model ultimately replaces the original model in real-world simulations or can be used to develop a low dimensional controller suitable for practical applications.

The challenge in model order reduction is the adaptivity to parameter changes. Due to the high potential sensitivity on parameter changes during the design and control phase, the ability to include parameter dependency in the reduced model is emphasized, especially since generally model order reduction procedure may require a considerable amount of calculations.

Parametric model order reduction methods are well suited for such design activities as they can reduce large systems of equations with respect to both frequency and other design parameters. Mainly interpolation based parametric model order reduction techniques allow the use of various types of parameters, such as layout, geometrical and physical features. Obtaining parametric reduced models and finding their ranges of validity and accuracy is one of the main focuses of the present research.