

Large-scale power system dynamic equivalents based on standard and border synchrony

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Abstract-

This paper fills the gap between the well-known in control theory model reduction techniques based on the balanced realization and the structure preserving dynamic model equivalencing approaches used in power systems. The relations between the synchrony and the loss of controllability and observability are investigated and, from that, new aggregation methodologies are proposed for two distinct situations. The first one corresponds to the case, already treated in the literature, where a full model is available for the power system which must be reduced. For the second one, which is new, it is considered that part of the data of the power system is not available when the reduction is performed. Both small theoretic and large-scale realistic examples are considered.

Index Terms- Balanced realization, controllability/observability, dynamic model reduction, standard and border synchrony.

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