MODEL ORDER REDUCTION FOR PHYSICS-BASED MACHINE LEARNING

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Inverse problems, uncertainty quantification and multidisciplinary design optimization are common problems in science and engineering that are associated with parametric studies and frequently require multiple evaluations of expensive numerical models. This presentation discusses methods that leverage the synergies between projection based model reduction and statistical learning to obtain physics-informed computationally efficient representations suitable for multi-query and time constrained applications in engineering [1, 2, 3]. In particular, we will discuss formulations for scientific machine learning that we developed to cope with small sets of available observations and address interpretability issues. Several case studies will be overviewed including computational fluid dynamics and computational mechanics problems in transportation engineering.

REFERENCES

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