

# Reduced-Order Modeling

## Objective

Development, justification,  
implementation, and demonstration

of

## Certified Reduced Basis Methods

for rapid and reliable solution of  
**parametrized**  
Partial Differential Equations (PDEs)

with application to

**real-time** and **many-query**

contexts such as

**optimization and control,**  
**parameter estimation,**  
**uncertainty quantification,**  
and

**multiscale analysis.**

## Certified Reduced Basis Methods

optimal sampling procedures — efficient spaces  
 $\implies$  rapid convergence

*a posteriori* error estimation — rigorous error bounds  
 $\implies$  accurate uncertainty estimates

offline/online strategies — low marginal cost  
 $\implies O(100)$  computational speedups

