Chair for Computation in Engineering
Deparment of Civil, Geo and Environmental Engineering
Technical University of Munich

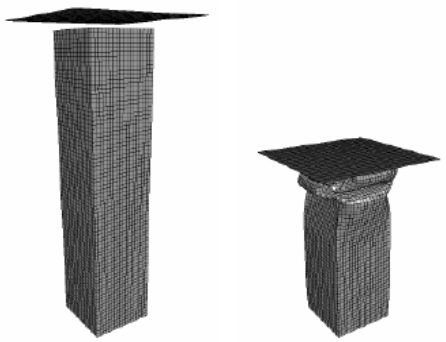
# Reduced basis adaptivity for model reduction

**Project Characteristics**

| | |
|---|---|
| Modeling: | ★★★★☆ |
| Mathematics: | ★★★★★ |
| Programming: | ★★★★☆ |
| Science: | ★★★★★ |

## Setting:

Nonlinear model order reduction aims at reducing the computation times of numerical simulations (e.g. FEM, CFD). This is done using a reduced basis matrix [**V**], extracted from a set of training simulations. In many scenarios, it is desirable to adapt the reduced basis to new physical phenomena which the existing empirical modes cannot represent to a sufficient level of accuracy. To this end, we would like to extend an existing Python-based reduced-order 1D Burgers' equation solver with the capability to adapt the reduced basis, following approaches in literature. The methods can be extended to FEM.



## Your Tasks:

Extend an existing Python solver such that:

- it can solve the dynamic Burgers' problem using RB adaptivity
- the adaptive methods work well together with hyper-reduction, e.g. DEIM
- it enables users to visualize the results, possibly in an interactive manner