# Stabilization techniques applied to POD-Galerkin methods for finite volume approximation of the Navier–Stokes equations

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## ABSTRACT

In the field of model reduction is crucial to create reduced order models (ROMs) that preserve the stability properties of the original system. Several methods are available in literature for the stability enforcement of reduced order methods.

One promising approach, known as supremizer stabilization [1, 2], is based onto the enrichment of the reduced basis space, with the solution of a supremizer problem, in order to fulfil the well known inf-sup condition. The efficiency and applicability of this stabilization technique has already been verified in the framework of reduced order methods based on high fidelity finite element solvers.

In this talk the extension of the present method to the case of POD-Galerkin reduced order methods [3] , obtained from a finite volume high fidelity approximation, in the framework of the incompressible Navier–Stokes equations, is analysed. The differences between finite-volume and finite-element-based ROMs are discussed and highlighted. The efficiency of the proposed method is verified with benchmark test cases.

## REFERENCES

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[3] Giovanni Stabile, Saddam Hijazi, Andrea Mola, Stefano Lorenzi, and Gianluigi Rozza. Advances in Reduced order modelling for CFD: vortex shedding around a circular cylinder using a POD-Galerkin method. *Submitted to Communications in Applied and Industrial Mathematics*, 2017.