



# Lothar-Collatz-Kolloquium für Angewandte Mathematik

**Donnerstag, den 21. Mai 2026, um 14:30 Uhr, im Hörsaal 2**

**Prof. Dr. Francois Vilar\***

(Montpellier University, ACSIOM team – Alexander Grothendieck Montpellier Institut)

## ***Monolithic local subcell DG/FV convex property preserving scheme***

### **Zusammenfassung/Abstract:**

This talk aims at presenting a subcell monolithic DG/FV convex property preserving scheme solving system of conservation laws on 2D unstructured grids. This is known that discontinuous Galerkin (DG) method needs some sort of nonlinear limiting to avoid spurious oscillations or nonlinear instabilities which may lead to the crash of the code. The main idea motivating the present work is to improve the robustness of DG schemes, while preserving as much as possible its high accuracy and very precise subcell resolution. To do so, a convex blending of high-order DG and first-order finite volume (FV) scheme will be locally performed at the subcell scale where it is needed. To this end, by means of the theory developed in our previous work, we first show that it is possible to rewrite DG scheme as a subcell FV scheme on a subgrid provided with some specific numerical fluxes referred to as DG reconstructed fluxes. Then, the monolithic DG/FV scheme will be defined as following: to each face of each subcell will be assigned two fluxes, a 1st-order FV one and a high-order reconstructed one, that will be in the end blended in a convex way. The goal is now to determine, through analysis, optimal blending coefficients to achieve the desired properties. Numerical results on various type problems will be presented to assess the very good performance of the design method.

By means of this subcell monolithic framework, we will also attempt to address the following questions: what do we mean by entropy stability? What is the cost of such constraints? Is this absolutely needed? Pieces of answers will be given.

### **Kontakt:**

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