UNIVERSITÀ DI PAVIA

Università degli Studi di Pavia
Ph.D. Program in
"Design, Modeling and Simulation in Engineering"

COMPMECH
Computational Mechanics & Advanced Materials
3D@UniPV
Virtual Modeling and Additive Manufacturing for Advanced Materials

2023 Piola Lecture

Are virtual elements the better finite elements?

The Virtual Element Method (VEM) is a recent methodology for the ap¬proximation of problems described by partial differential equations. Virtual elements can be considered as a gen¬eralization of finite elements. The main asset of the virtual element method is the possibility of using mesh elements with arbitrary geometrical forms, thus allowing very complex meshes. Such feature opens up a significant flexibility for the discretization, even for low order ansatz spaces.

So far the method has been applied to problems in solid and fluid mechanics including the treatment of unilateral constraints and to different coupled problems describing electro-magneto-mechanical responses.

Besides obvious advantages VEM has also disadvantages. These will be discussed in the light of engineering applications using VEM. Furthermore, we will investigate the relations with the Finite Element Method and show specific also here advantages and disadvantages.

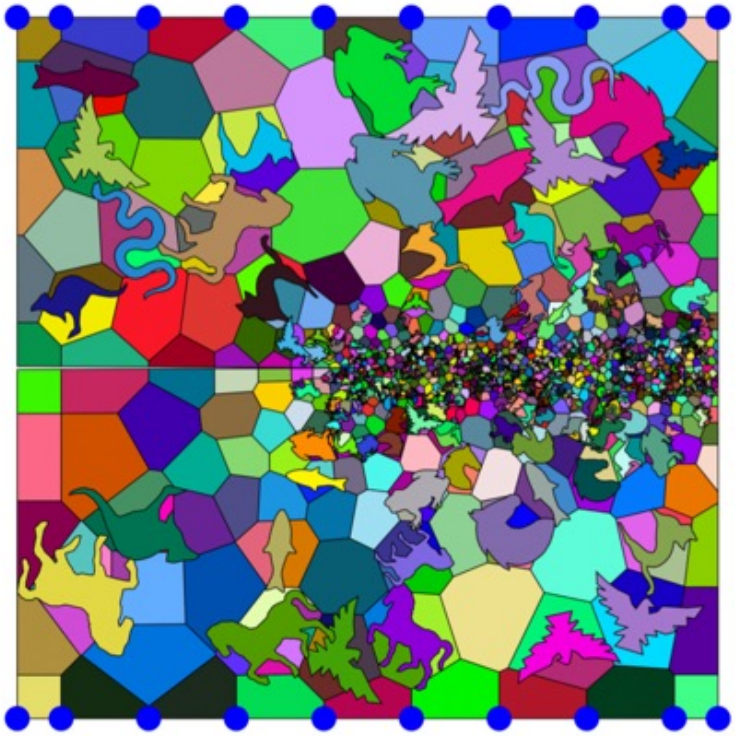

Figure: *Vem discretization for a plate with a crack*

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