

Short Course on Enriched Finite Element Methods

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Course site www.wccm2018.org/18SC_003

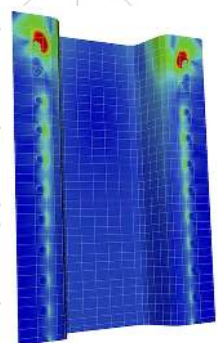
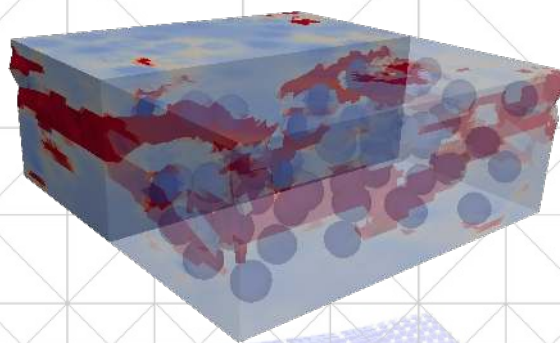
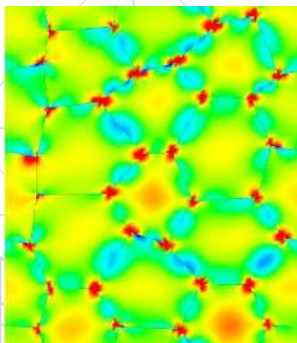
Course description and objectives

Enriched FE methods such as the eXtended/Generalized Finite Element Method (X/GFEM) have received increased attention and undergone substantial development during the last decade. Enriched methods offer unprecedented flexibility in the construction of shape functions and corresponding approximation spaces. With the proper selection of enrichment functions, these methods are able to address many shortcomings and limitations of the classical FEM while retaining its attractive features.

In this short course we will delve into enriched finite element formulations, presenting a survey on state-of-the-art methodologies for solving, in an efficient manner, problems that challenge the classical FEM. Participants will be introduced to these methods' approximation theory and application to model discontinuities such as material interfaces, cracks, and voids. Recent developments such as the Stable Generalized FEM (SGFEM) and the newly introduced Discontinuity-Enriched Finite Element Method (DE-FEM) are also presented. We discuss the implementation details of these methods in existing displacement-based FEM software. Detailed lecture notes and a 3-D implementation of the X/GFEM will also be given to participants.

By the end of this course, participants will

- understand state-of-the-art enriched finite element formulations and identify problems where such formulations could be used;
- understand the computational challenges associated with the implementation of enriched method in standard displacement-based finite element packages.



Target audience

Doctoral and post-doctoral students, researchers, academics as well as developers from industry and national laboratories.