Study and implementation of moving finite element method in 2D

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Nonlinear partial differential equations often lead to strongly non smooth (shock or near-shock) solutions. In that situation classical fixed grid methods fail to produce an adequate numerical approximation in a reasonable time. Till now a number of computational algorithms were developed to overcome this difficulty. All of them allow computational grid to move together with critical regions of the solution automatically. However, already in a one dimensional case there are a number of challenges related to reliability and efficiency of the proposed methods. In higher dimensions the situation becomes even more complicated.

In this talk we present theoretical and numerical analysis of these techniques in the case of two spatial dimensions. The first part deals with the study of finite element discretization on moving grids. The second part includes practical implementation and tests of the algorithms on a representative set of differential equations.

References

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