IFEM - an isogeometric toolbox for the solution of PDEs

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ABSTRACT

We present IFEM, our open-source toolbox for solving PDEs using isogeometric methods. The toolbox has been under development at SINTEF Digital since 2010. Among its features is support for adaptive simulations based on locally refined splines [4] facilitating recovery-based error estimates [5]. It is fully parallel and can be used on machines with shared or distributed memory models, as well as the combination, in order to handle complex problems such as high Reynolds number flow [7], [8].

Essential and natural boundary condition handling has been carefully considered in order to be consistent with divergence-conforming discretization of Stokes problems [3], turbulent Navier-Stokes problems [10] and Fluid-Structure interaction [9]. Furthermore, we strive to achieve generality and reusability across a large set of problems and problem sizes [6], [1], [2].

In this presentation we focus on some of the additional challenges posed, and opportunities offered, when implementing IGA in a generic, parallel framework.

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