RECENT ADVANCES IN IMMERSED BOUNDARY AND FICTITIOUS DOMAIN METHODS

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ABSTRACT

In scientific and industrial applications, a large part of the overall effort invested for a finite element analysis is very often devoted to geometric modelling and the transition to an analysis suitable model including mesh generation. To avoid the need for classical meshing, fictitious domain methods were introduced already in the early 1960s. Since then many variants of these appealing approaches have been suggested, like embedded domain, immersed boundary methods or special implementations of the extended finite element method. Whereas in earlier years the major interest concentrated on mathematical aspects of fictitious domain methods, more recently a lot of progress has been observed in engineering sciences. This is also because fictitious domain and immersed boundary methods share a decisive paradigm with Isogeometric Analysis: 'Better support design-through-analysis by closely coupling geometric modelling and numerical simulation'.

This mini-symposium will focus on fictitious domain methods devoted mainly, but not limited to problems in solid mechanics, including possible interactions with other physical fields (e.g. heat, fluid, etc.). The topics of this mini-symposium will range from modelling aspects including the coupling of analysis and CAD, mathematical analysis, adaptivity and implementational issues to the efficient solution of complex engineering problems. It will address low and higher order fictitious domain approaches, the Finite Cell Method as well as combinations with the Isogeometric Analysis or recent approaches to topology optimization.