

Coupled Problems Solution by Operator Split Methods and Efficient Software Development by Code-Coupling

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ABSTRACT

The goal to provide an efficient approach to development of software computational platform is of very large interest for currently very active research domain of multiphysics and multiscale analysis in fully nonlinear setting. The typical problem to be solved is nonlinear evolution problem, with different scales in space and time (Ibrahimbegovic 2005, 2009, 2016). We show here that a successful solution to such a problem requires gathering the sound theoretical formulation, the most appropriate discrete approximation and the efficient numerical implementation. In particular, the most efficient numerical implementation is obtained by reusing the existing codes, in order to accelerate the code development and validation. The key element that makes such an approach possible is the Component Template Library (CTL), presented in this work. We show that the CTL allows to seamlessly merge the existing software products into a single code at compilation time, regardless of their 'heterogeneities' in terms of programming language or redundancy in use of local variables. An illustrative example of code-coupling for fluid-structure interaction is given in Fig. 1.

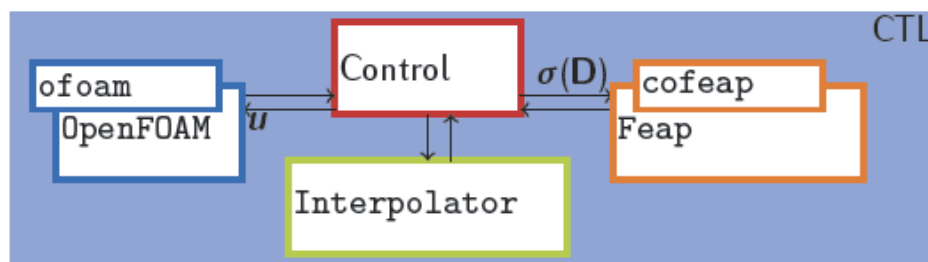


Fig. 1 Code-coupling strategy for FEAP and OpenFOAM

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