A (MULTISCALE?) THREE-FIELD METHOD

Abstract. In this work, we propose solving the Poisson problem using a finite element technique based on domain decomposition concepts. Essentially, we divide the PDE domain into sub-regions and solve the PDE "locally." These solutions can be coupled using Lagrange multipliers to ensure global smoothness (i.e., ensuring the solution lies within an appropriate Sobolev space). In our case, we also include the other parts in order to—once again—introduce the Lagrange multiplier into the appropriate space. This is done using a second multiplier. We thus have three fields: local solutions u; the first multiplier, which is the normal derivative of u; and the second multiplier, which is the trace of u. All this allows the Poisson problem to be rewritten in terms of traces. When we discretize the trace, we obtain a numerical method. This is joint work with Franklin de Barros and Fred Valentin (both from LNCC).

Authors.

(1) Alezandre Madureira. *Laboratório Nacional de Computação Científica - LNCC. Petrópolis, Brazil.*

(2) Franklin de Barros. *Laboratório Nacional de Computação Científica - LNCC. Petrópolis, Brazil.*

(3) Fred Valentin. *Laboratório Nacional de Computação Científica - LNCC. Petrópolis, Brazil.*