NONCONFORMING SEMs AND OPTIMAL CONTROL PROBLEMS*

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In the last years, optimal control problems have been used in many applications in science and engineering. Solving an optimal control problem requires to choose an optimization technique and a method to discretize the optimality system. Whereas a great attention has been dedicated to the standard finite element discretization, less it is known on the use of high order discretization. One point of investigation is how the accuracy obtained on state, control or adjoint variable influences the accuracy of the optimal control problem itself. Besides, from the numerical point of view optimal control problem with PDE could involve a huge number of degree of freedom, therefore a model order reduction by adaptive discretization is useful to derive fast and reliable solver for PDE optimal control.
In this work, we present a high order discretization for an optimal control problem governed by PDE. As in [3], an automatic optimization-adaptive tool is presented to solve the problem, taking care of both accuracy and model order reduction. This algorithm is based on local posteriori error estimates and mesh or functional adaptive strategy, [1, 4]. We focus on how the use of different local error estimates and adaptive strategies could affect the final optimized discrete model. Numerical examples illustrate the performance of the proposed algorithm with respect to a different optimization-adaptive process, [2, 3].

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