Error a posteriori estimation for a problem of optimal control of the obstacle

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Abstract: This poster is devoted to a problem of the optimal control of the obstacle represented as follows

$$\min_{\psi\in U_{ad}}\left\{\frac{1}{2}\int_\Omega (\mathcal{T}_g(\psi)-z)^2dx+\int_\Omega(\nabla\psi)^2dx\right\} \tag{1}$$

subject to:

$$\forall v\in\mathcal{K}(\psi):\ a(y,\, v-y)+\langle g(y)-f,\, v-y\rangle\geq 0\,;\ y\in\mathcal{K}(\psi) \tag{2}$$

such that

$$\mathcal{K}(\psi)=\left\{y\in H_0^1(\Omega);\, y\geq\psi,\ \ \mathrm{pp\,dans}\,\Omega\right\} \tag{3}$$

$$a(u,v)=\sum_{i=1}^n\left(\sum_{j=1}^n a_{ij}\int_\Omega\frac{\partial u}{\partial x_i}\frac{\partial v}{\partial x_j}dx+b_i\int_\Omega v\frac{\partial u}{\partial x_i}dx\right)+\int_\Omega cuvdx \tag{4}$$

where $a_{i,j}$, b_i and c in $L^\infty(\Omega)$. Moreover, on suppose $a_{i,j}\in\mathcal{C}^{0,1}(\Omega)$ (space of Lipschitz functions continues on Ω) and c non negative, where the form bilinear $a(.,.)$ is continuous and coercive with M et m are respective

Despite the non-differentiability of the $y=\mathcal{T}_g(\varphi)$ application, this type of problem has been widely studied by several authors on a mathematical level (see for example [1, 2] but little has been done digitally.

After finite element discretization, and in spite of the non-convex character of this kind of problem, our main goal is to give estimates of the a posterior errors on the state and the control (see for example [2]).

Keywords: Probleme of the obstacle, optimal Control , Penalization

References

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