Various Ways to Get Sparsity in Control Problems of Parabolic Equations

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ABSTRACT

In this talk we consider optimal control problems associated to semilinear parabolic equations. Looking for sparsity of the optimal controls, we propose some different formulations of the cost functional and we analyze the resulting control problems. First, we derive the first order optimality conditions. From these we deduce the different sparse structures of the optimal controls according to the various formulations. All of them are interesting and can be useful in different applications. Finally, we study the necessary and sufficient second order optimality conditions, which are essential to prove stability properties of the control problems and to get error estimates for the numerical discretization. The sufficient second order optimality conditions are not standard, sometimes due to the non-differentiability of the cost functional, some others due to the lack of a Tihonov type regularization term in the cost functional.