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A new multigrid method for unconstrained parabolic optimal control problems

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Statement of Contribution

Computation of optimal control is always challenging but is critically important for digital implementation of optimal control. The approach is not only required to establish a theoretical convergence scheme but requires such a scheme to be practical for real-time solution.

In this paper, we establish a new method to solve the first-order necessary optimality system of the standard parabolic optimal control problems. The proposed approach is new and not available in literature. The proof of convergence given in the paper is new, and a detailed fast algorithm for solving the problem is established. Numerical examples confirm our theoretical analysis. The obtained results are important and useful in terms of solving this type of problems. Comparisons with existing algorithms are provided to illustrate the effectiveness of our proposed approach.

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