Finite Element Approximations for Fractional Parabolic Optimal Control Problems - a Priori Error Estimates

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Abstract: In this paper, a numerical theory based on finite element approximations for fractional parabolic optimal control problems is presented and analyzed. The state and co-state variables are approximated by the piecewise linear functions and the control is approximated by piecewise constant functions and finite difference scheme procedure is used to solve fractional FEM. We derive, a priori error estimates for both the control variable and the state variables. We illustrate with a numerical example to confirm our theoretical results.

Keywords: time-fractional derivatives, finite element methods, optimal control problems, a priori error estimates.

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