INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Name of Thesis Supervisor(s)	:	Prof. Rajen Kumar Sinha
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SHORT ABSTRACT

The main objective of the thesis is to derive a posteriori error estimates for finite element discretizations of optimal control problems governed by parabolic partial differential equations. Both distributed and boundary parabolic optimal control problems are considered and analyzed.

We first study $L^\infty(0,T; L^2(\Omega))$- a posteriori error analysis for parabolic optimal control problem (POCP) with distributed control. To discretize the state and co-state variables we use the piecewise linear and continuous finite elements, while the piecewise constant functions are used to discretize the control variable. The backward Euler scheme is applied for the time discretization. An elliptic reconstruction technique in conjunction with energy argument is used to derive a posteriori error estimates for the state and co-state variables in the $L^\infty(0,T; L^2(\Omega))$- norm. The first-order necessary optimality condition is used to derive the error estimate for the control variable in the $L^\infty(0,T; L^2(\Omega))$-norm. The second problem considers the POCP with distributed control and discusses a posteriori error analysis for both semi-discrete and fully discrete finite element method. The variational discretization is used to approximate the state and co-state variables with the piecewise linear and continuous functions, while the control variable is computed by using the implicit relation between the control and co-state variables. The temporal discretization is based