



THE UNIVERSITY OF
CHICAGO

Department of Statistics

DISSERTATION PRESENTATION AND DEFENSE

WANTING XU

Department of Statistics
The University of Chicago

On the Optimal Estimation, Control, and Modeling of Dynamical
Systems

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ABSTRACT

This thesis includes four projects generally on computational and statistical methods for optimal estimation, control, and modeling of dynamical systems. I will start with an overview of each part, and then focus on the project on an exponentially accurate temporal decomposition method for long horizon dynamic optimization. The problem is discrete-time, linear, time-dependent and with box constraints on the control variables. We prove that an overlapping domains temporal decomposition, while inexact, approaches the solution of the long-horizon dynamic optimization problem exponentially fast in the size of the overlap. The resulting subproblems share no solution information and thus can be computed independently in parallel. Our findings are demonstrated with a small, synthetic production cost model with real demand data.