1098-93-101 **Teresa Lebair*** (ei44375@umbc.edu), 1000 Hilltop Circle, Baltimore, MD 21250, and **Jinglai Shen** (shenj@umbc.edu), 1000 Hilltop Circle, Baltimore, MD 21250. *Optimal Control Approach and Numerical Methods for Constrained Smoothing Splines.*

With a plethora of applications in science and engineering, shape constrained estimation garners increasing attention in the areas of applied mathematics and statistics. Smoothing spline estimators subject to inequality shape constraints are an efficient array of shape constrained estimators, whose performance often surpasses that of their unconstrained counterparts. These estimators can be formulated as the solutions of optimal control problems, and thus, optimal control techniques play a critical role in the numerical resolution and statistical performance analysis of these estimators. We consider the computation and numerical analysis of smoothing splines subject to general dynamics and control constraints, as well as (initial) state constraints. The optimal control formulation of shape constrained smoothing splines is developed. Additionally, two algorithms, namely a directional derivative based nonsmooth Newton method and a projection based algorithm, to compute these constrained splines are introduced. The convergence analysis of these algorithms is presented along with several numerical examples. (Received January 16, 2014)