1065-65-126 **Andrei Draganescu*** (draga@umbc.edu), UMBC, Department of Mathematics and Statistics, 1000 Hilltop Circle, Baltimore, MD 21250, and **Cosmin Petra**. *Multigrid preconditioning of linear systems for interior point methods applied to a class of box-constrained optimal control problems.*

In this work we construct and analyze multigrid preconditioners for a class of operators arising in the solution process of distributed optimal control problems with box constraints on the controls. The presented preconditioning technique is related to the one developed by Draganescu and Dupont for the associated unconstrained problem, and is intended for large-scale, high-resolution problems. As in the unconstrained case, the quality of the resulting preconditioners is shown to increase with mesh-size $h \to 0$ at a rate that is optimal with respect to h. We test this algorithm first on a Tikhnov-regularized backward parabolic equation with box constraints and on an elliptic-constrained optimization problem. In both cases it is shown that the number of linear iterations per optimization step, as well as the total number of fine-scale matrix-vector multiplications is decreasing with increasing resolution, thus showing the method to be potentially very efficient for truly large-scale problems. (Received September 09, 2010)