1025-49-272 **Mark A. Abramson*** (mark.abramson@afit.edu), Department of Mathematics and Statistics, AFIT/ENC, Bldg 641, 2950 Hobson Way, Wright-Patterson AFB, OH 45433, and **Thomas J. Asaki**, **John E. Dennis, Jr.**, **Kevin R. O'Reilly** and **Rachael L. Pingel**. *Quantitative Object Reconstruction using X-Ray Tomography and Mixed Variable Optimization.*

We consider the problem of quantitatively reconstructing a cyllindrically symmetric object using Abel transform-based x-ray tomography. Specifically, we obtain radiograph data by x-raying an object and attempt to quantitatively determine the number and types of materials and the thicknesses of each concentric material layer. Current methodologies either fail to provide a quantitative description of the object or are generally too slow to be useful in practice. As an alternative, we model the problem as a mixed variable program, in which some variables are nonnumeric and for which no derivative information is available. The Audet-Dennis mixed variable pattern search (MVPS) algorithm is applied to the x-ray tomography problem, by means of the NOMADm MATLAB software package. Numerical results are provided for several test objects and show that, while there are difficulties to be overcome, our approach is promising for solving this class of problems in practice. (Received January 23, 2007)