1014-45-1553 **Zhewei Dai*** (dai@alma.edu), Department of Mathematics and Computer, Science, Alma College, Alma, MI 48801, and **Patricia K Lamm** (lamm@math.msu.edu), Department of Mathematics, Michigan State University, East Lansing, MI 48824. *Local Regularization of the Autoconvolution Problem.*

We develop a local regularization theory for the nonlinear autoconvolution problem. Unlike the classic regularization techniques such as Tikhonov regularization, this theory provides regularization methods that preserve the causal nature of the autoconvolution problem, allowing for fast sequential numerical solution. We prove the convergence of the regularized solutions to the true solution as the noise level in the data shrinks to zero, with a certain convergence rate. We propose several regularization methods and provide theoretic basis for their convergence. Our numerical results confirm effectiveness of the methods, suggesting superiority of our methods over the existing ones, especially in recovering sharp features in the solution. (Received September 28, 2005)