1164-35-20 **Michael Klibanov***, 9201 University city Blvd, Charlotte, NC 28223. *Carleman Estimates For Globally Convergent Numerical Methods for Coefficient Inverse Problems.* Preliminary report.

We develop the convexification method to solve coefficient inverse problems (CIPs). In general, CIPs are severely ill-posed and highly nonlinear. Solving them using the least-squares optimization might not deliver reliable solutions; especially. when an initial guess of the true solution is not provided. This is because the cost functionals are not convex. They might have multi-local minima and ravines. The main idea of our convexification method is to use the Carleman weight function to convexify such functionals. Hence, the lack of the initial guess of the true solution can be overcome. Our main theorems involve (1) construct a convex cost functional with the presence of the Carleman weight function, (2) the existence of the unique global minimizer, and (3) the global convergence of the minimizing sequence due to the gradient projection method to the true solution of the CIPs. In particular, we will present the convexification method and the resulting numerical solutions to a CIP for the Helmholtz equation in 3D from both simulated and experimental data. The experimental data are collected by our microwave laboratory. In addition, we will show our convexification-like results for many other CIPs. (Received December 22, 2020)