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Compute Conservation Law Using L_1 Minimization. Preliminary report.

The computation of conservation law is a classical subject that attracts lots of studies. The main concern lies in how to handle the discontinuities developed in the solutions, even when they start with perfectly smooth data. We study the theoretical aspects of a two-step L_1 -minimization based algorithm to solve the conservation law. It applies an L_1 minimization on top of an Lax-Wendroff scheme so that the modified numerical results could pick up shocks and suppress artificial oscillations in the conservation law solutions. We analyze the scheme properties and prove the existence and uniqueness of the L_1 -minimization step by rewriting the problem as a lasso problem. Several experiments are carried out to show the effectiveness of our algorithm. In the experiments, we utilize the least-angle regression (LARS) algorithm to get a solution path for the minimization problem as a function of the regularization parameter. (Received August 19, 2018)