

## Abstract

In this thesis, entropy conservative and entropy stable finite volume methods for one-dimensional scalar conservation laws are studied. The need for weak solutions is shown and entropy is explored to obtain uniqueness. Using discrete analogues of properties of entropy solutions, entropy stable finite volume methods are constructed and implemented to solve a number of scalar conservation laws, in particular the transport equation, Burgers' equation, a traffic flow problem and a model for enhanced oil recovery. The solutions obtained are accurate leading up to shocks, at which point the solutions break down. The viscous approximation to the scalar conservation law is solved to further understand the behaviour of solutions after shocks. It is theoretically shown and experimentally validated that the finite volume schemes are stable. Second order convergence is observed for all test problems with several different choices of numerical fluxes. The experiments indicate that numerical fluxes conserving or dissipating the squared entropy have the smallest errors.