CONVERGENCE OF GODUNOV-TYPE SCHEMES FOR
SCALAR CONSERVATION LAWS UNDER LARGE
TIME STEPS

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ABSTRACT. We consider convergence of classical high order Godunov-type schemes towards entropy solutions for scalar conservation laws. It is well known that sufficient conditions for such convergence include total variation boundedness of the reconstruction and cell or wavewise entropy inequalities. We prove that under large time steps, we only need total variation boundedness of the reconstruction to guarantee such convergence. We discuss high order total variation bounded reconstructions to fulfill this sufficient condition and provide numerical examples on one dimensional convex conservation laws to assess the performance of such large time step Godunov-type methods. To demonstrate the generality of this approach, we also prove convergence and give numerical examples for a large time step Godunov-like scheme involving Sanders’ third order total variation diminishing reconstruction using both cell averages and point values at cell boundaries. This is a joint work with Jingmei Qiu.