Meeting: 1004, Bowling Green, Kentucky, SS 13A, Special Session on Nonlinear Analysis and Applied Mathematics

1004-35-161 **Yong Jung Kim*** (ykim@math.ucr.edu), Department of Mathematics, Univercity of California-Riverside, 202 Surge Building, Riverside, CA 92521-0135. *Long time asymptotics for scalar conservation laws via potential comparison.*

Recently a potential comparison technique is developed for nonlinear diffusion equations and the optimal asymptotic convergence has been shown. (cf. Invited Address by Robert J. McCann on "Optimal convergence rates for the fastest conservative nonlinear diffusions") This method consists of several steps and is applicable to other problems after an appropriate adaptation. In the talk a convection equation is considered with or without a diffusion term.

Brief sketch: Let $u, \tilde{u}$ be any two solutions and $U, \tilde{U}$ be their potentials. In our case, a primitive of the solution can be used as a potential. The first step is to show the potential comparison principle that is

$$U(x,t) \le \tilde{U}(x,t) \ \text{ for } \ t \ge t_0,\ x \in \mathbf{R} \quad \text{ if } \ U(x,t_0) \le \tilde{U}(x,t_0) \ \text{ for all } \ x \in \mathbf{R}.$$

Then we obtain two constants $T, t_0 > 0$ such that

$$\tilde{U}(x, t_0 + T) \le U(x, t_0) \le \tilde{U}(x, 0).$$

Therefore,

$$\|U(x,t) - \tilde{U}(x,t)\|_{L^\infty} \le \|\tilde{U}(x, t+T) - \tilde{U}(x, t-t_0)\|_{L^\infty}, \quad t \ge t_0.$$

The right hand side can be estimated explicitly. The last step is to transfer this estimate for potential different $U - \tilde{U}$ to the solution difference $u - \tilde{u}$. Finally we obtain optimal convergence of order $1/t$. (Received January 24, 2005)