**Meeting:** 1004, Bowling Green, Kentucky, MCCANN, Invited Address

1004-35-17 **Robert J McCann*** (mccann@math.toronto.edu), Department of Mathematics, University of Toronto, 100 St. George Street, Room 4072, Toronto, Ontario M5S 3G3, Canada. *Optimal convergence rates for the fastest conservative nonlinear diffusions.*

In many diffusive settings, initial disturbances will gradually disappear and all but their crudest features — such as size and location — will eventually be forgotten. Quantifying the rate at which this information is lost is sometimes a question of central interest. Joint work with Yong Jung Kim (UC Riverside and KAIST) addresses this issue for the fastest conservative nonlinearities in a model problem known as the fast diffusion equation

$$u_t = \Delta(u^m), \qquad (n-2)_+/n < m \leq n/(n+2), \quad u, t \geq 0, \quad x \in \mathbf{R}^n,$$

which governs the decay of any integrable, compactly supported initial density towards a characteristically spreading self-similar profile. For other values of the parameter $m$, this equation has been used to model heat transport, population spreading, fluid seepage, curvature flows, and avalanches in sandpiles. For the fastest conservative nonlinearities, we develop a potential theoretic comparison technique which establishes the sharp conjectured power law rate of decay $1/t$ uniformly in relative error, and in weaker norms such as $L^1(\mathbf{R}^n)$.

I shall also survey developments in the porous medium $m > 1$ and the fast diffusion $m \in ]n/(n+2), 1[$ regimes, including works with Jochen Denzler and Dejan Slepcev. (Received December 11, 2004)