1099-60-203   **Salah-Eldin A. Mohammed*** (`salah@sfde.math.siu.edu`), Department of Mathematics, Southern Illinois University-Carbondale, Carbondale, IL 62901, **Torstein Nilssen**, Department of Mathematics, University of Oslo, Oslo, Norway, and **Frank Proske**, Department of Mathematics, University of Oslo, Oslo, Norway. *"Differentiable Flows for Singular SDE's and Applications to the Transport Equation"*.

Abstract:

In this talk, we establish the existence of a stochastic flow of Sobolev diffeomorphisms for an SDE driven by a bounded measurable drift and additive Brownian motion. The result is striking, since the dominant 'culture' in stochastic (and deterministic) dynamical systems is that the flow 'inherits' its spatial regularity from the driving vector fields. The spatial regularity of the stochastic flow yields existence and uniqueness of a Sobolev differentiable weak solution of the (Stratonovich) stochastic transport equation. It is well-known that the deterministic transport equation does not in general have a solution. Using stochastic perturbations and our analysis of the above SDE, we establish a deterministic flow of Sobolev diffeomorphisms for classical one-dimensional (deterministic) ODE's driven by discontinuous vector fields. Furthermore, and as a corollary of the latter result, we construct a Sobolev stochastic flow of diffeomorphisms for one-dimensional SDE's driven by discontinuous diffusion coefficients. This is joint work with T. Nilssen and F. Proske. (Received February 08, 2014)