1077-93-62 **Nasir U Ahmed*** (ahmed@site.uottawa.ca), University of Ottawa, Ottawa, Ontario K1N6N5, Canada. *Stochastic Differential Equations on Banach Spaces and Optimization of Supports of Measures Induced.*

Let X,E be a pair of separable Banach spaces. The system we consider is governed by a semilinear stochastic differential equation on X

$$dx = Axdt + Bx(t)dt + f(x)dt + CdW(t), x(0) = x_0, t \in I \equiv [0,T], \tag{1}$$

where A is the infinitesimal generator of a C_0-semigroup of bounded linear operators $\{S(t), t \geq 0\} \subset \mathcal{L}(X)$, $B \in \Gamma \subset \mathcal{L}(X)$, $f : X \longrightarrow X$ is a continuous map, $C \in \mathcal{L}(E, X)$ and $W(t), t \geq 0$, is an E valued Brownian motion. For $B \in \Gamma$, $t \geq 0$, let $\mu_t^B \in \mathcal{M}_1(X)$ denote the probability measure induced by the solution process $\{x^B(t), t \geq 0\}$. Our objective is to find sufficient conditions on Γ under which, for each $t \geq 0$, the reachable set of measures given by

$$\mathcal{R}(t) \equiv \left\{ \mu \in \mathcal{M}_1(X) : \mu = \mu_t^B, \text{for } B \in \Gamma \right\} \tag{2}$$

is tight or weakly relatively compact. In fact we prove that it is weakly compact. Then we use this result to solve several optimal control problems requiring control of supports and other functionals of measures with $B \in \Gamma$ as the linear feedback operator. (Received July 15, 2011)