1085-60-78 **Gopal K Basak***, Stat-Math Unit, 203 B. T. Road, Indian Statistical Institute, Kolkata, India, and **Arunangshu Biswas** (arunb12002@gmail.com), Presidency University, Kolkata, India.
TITLE Adaptive MCMC with a random scaling parameter as a tuner and diffusion approximation.

ABSTRACT

Adaptive Markov Chain Monte Carlo (AMCMC) is a class of algorithms that has been recently proposed in MCMC literature. In the AMCMC, there is a tuning parameter, in this case a scaling parameter, which is a function of the previous sample paths. Thus, it is a random variable that changes according to samples chosen. Also, the chain moves along with scaling parameter. This scaling parameter determines how fast the simulation converges to the desired distribution, say ϕ. However, this destroys the Markovian structure of the chain.

In the present work, the use of diffusion approximation technique on the discrete time AMCMC gives rise to a Ornstein-Uhlenbeck type diffusion with a random scaling parameter that satisfy a differential equation. Viewing it together as a two dimensional singular diffusion, and going through Hormander's hypoelliipticity and tightness the existence of smooth density is observed. Further moment bounds are achieved to use stein's idea to recover the desired distribution ϕ as the marginal of the two-dimensional invariant distribution. Further, some simulations are done for various distribution to compare the Adaptive with the Non-Adaptive or Standard MCMC. (Received August 31, 2012)