1052-60-270 **Peter J. Thomas*** (pjthomas@case.edu), 10900 Euclid Avenue, Cleveland, OH 44106. *On the periodically forced Ornstein Uhlenbeck process with reset.* Preliminary report.

We study a hybrid stochastic process combining an Ornstein Uhlenbeck process (OUP) with deterministic reset upon reaching a threshold. Between resets, the OUP obeys a stochastic differential equation with periodically varying drift coefficient. Such a system arises in a neuroscience context as a model for a nerve cell driven by a periodically varying transmembrane current, the "leaky integrate and fire" (LIF) model with periodic forcing and additive noise. In the absence of noise the periodically forced LIF model falls in the general class of deterministic circle maps, which can show a rich variety of asymptotic dynamical behaviors. In the presence of noise, however, numerical results suggest that the distribution of reset times relative to the periodic drive converges to a unique stationary distribution independent of initial conditions. To date there are few analytical results available in this direction. We derive a condition on the first passage time distribution for the periodically forced OU process that is necessary and sufficient to guarantee convergence of the distribution of reset times relative to the forcing. We conjecture that this condition is met by the LIF model in a certain parameter regime (suprathreshold injected currents with weak periodic modulation). (Received August 30, 2009)