1067-92-498 **Peter J. Thomas*** (pjthomas@case.edu), Department of Mathematics, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, OH 44106. *Synchronization of periodically forced Ornstein Uhlenbeck processes with reset.* Preliminary report.

Ornstein Uhlenbeck processes with fixed threshold and reset appear in a neuroscience context as *noisy integrate-and-fire models*:

$$\begin{aligned} T_0 &= t_0 \\ dX(t) &= (-X + \alpha + \beta h(t))\,dt + \sigma\,dW(t), \quad T_k \le t < T_{k+1} \\ T_{k+1} &= \inf\{t | \mathcal{S}(T_k, t) \ge \theta\} \\ X(T_{k+1}) &= x_0, \end{aligned}$$

where T_k is a sequence of firing times, $X(t)$ is a strong Markov process, $t_0,\ x_0,\ \alpha,\ \beta,\ \theta$ and σ are (fixed, deterministic) constants, $\mathcal{S}(u,t) = \sup\{X(s) | s \in (u,t]\})$, W is a standard Brownian motion and $h(t)$ is a periodic forcing function. Keener, Hoppensteadt and Rinzel (1981) exhaustively classified phase locking in the case $h(t) = \sin(\omega t)$ and $\sigma = 0$. Wan and Tuckwell (1982) obtained analytic expressions for the mean and variance of the first passage time in the case $\beta = 0$. Under suitable assumptions on the constants we prove the existence of a unique invariant measure characterizing the distribution of the firing time phases $T_k \bmod T$. (Received September 07, 2010)