# SYNCHRONIZATION AND FREQUENCY DOUBLING IN THE CRAYFISH MECHANO-PHOTORECEPTOR SYSTEM

*Frank Moss*
Center for Neurodynamics
University of Missouri at St. louis
St. Louis, MO 63121 USA
mossf@umsl.edu
http://neurodyn.umsl.edu

*Sonya Bahar*
Weill-Cornell Medical College
New York, NY 10021 USA
ssb2001@med.cornell.edu
http://neurodyn.umsl.edu

## ABSTRACT

Hydrodynamic signals are detected in the crayfish peripheral nervous system by a set of hairs arrayed over the surface of the animal's tailfan. These mechanosensors connect to afferent neurons that synapse onto two photoreceptor neurons (caudal photoreceptors, or CPRs). We demonstrate stochastic phase synchronization of the CPRs with weak, sinusoidal hydrodynamic signals similar to those generated by predators of the crayfish [1]. The effects of light intensity on the synchronization and transduction processes are explored. At larger stimulus intensities we observe frequency doubling and rectification. A simple model accounts for these effects.

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## References

[1] Bahar, S. Neiman, A, Wilkens, L.A. and Moss, F. (2002) Phase Synchronization and stochastic resonance effects in the crayfish caudal photoreceptor. *Phys. Rev. E.* **65:**050901.