Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Reversal of motion induced by coupling in Brownian motors ERIN CRAIG, Simon Fraser University and University of Oregon, MARTIN J. ZUCKERMANN, Simon Fraser University, HEINER LINKE, University of Oregon — We use numerical simulations to examine the behavior of coupled particles in a 'flashing ratchet' system, in which an object undergoing free diffusion is periodically subjected to an asymmetric periodic potential that biases the motion of the object without using macroscopic force fields. We are exploring ratchet systems where the object is large enough for the finite size, the shape, and the internal degrees of freedom to play an integral role in the transport mechanism. In contrast to the behavior of a point particle, reversal of motion is observed for two or more particles forming a rigid rod constrained to move in one dimension. If the rods, however, are allowed to move in three dimensions, or if their length is much less than the spatial period of the ratchet potential, the reversal of motion disappears and the qualitative behavior of single particle motion is recovered. We will also discuss the effect of inducing partial flexibility into the rods, as well as the possibility of reversal for polymers in a ratchet.

Heiner Linke
University of Oregon

Date submitted: 30 Nov 2004 Electronic form version 1.4