Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Simulation studies of creeping flexible nematogens: flocking and rectifying barriers[1] ADAM NICHOLAS, Beloit College, ROBIN SELINGER, Kent State Univ. — Recent simulation studies of active nematics have focused on rigid rods or swimming bacteria undergoing collisions via simple rules. Here we present a more physically detailed model of self-propelled creeping flexible nematogens. Each segmented "worm" is represented as nine interaction sites connected by springs. The springs' equilibrium length is modulated, causing each worm to elongate and contract periodically. Each worm alternately grips the substrate at its leading or trailing end, producing creeping locomotion. Inter-worm interactions are described via the Weeks-Chandler-Anderson potential between nearby interaction sites. Random forces and damping are also added. For worms that reverse crawling direction at random intervals, we observe a homogeneous nematic phase, and study its behavior in the presence of a rectifying barrier. For worms that move only in a single direction, we observe flocking behavior characterized by evolving stripes of densely crowded particles interspersed with low-density regions. We compare these results with relevant experiments and related theory/simulation approaches.

[1]Supported by NSF-CHE-1004987 (Kent State REU)

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Date submitted: 19 Nov 2010 Electronic form version 1.4