1058-92-235 **Chad M. Topaz*** (ctopaz@macalester.edu), Macalester College, Dept. of Math, Statistics & Computer Science, 1600 Grand Ave., St. Paul, MN 55105, and **Andrew J. Bernoff**, **Sheldon Logan** and **Wyatt Toolson**. *Locust swarms: Discrete models, homogenization, and variational minimization.*

We construct a high-dimensional ODE model of desert locust swarms. The model incorporates social interactions, gravity, wind, and the effect of the impenetrable boundary formed by the ground. The dynamics of the group depend crucially on whether the underlying statistical mechanics are H-stable or catastrophic. Catastrophic swarms can form a rolling "bubble" with grounded locusts, airborne locusts, and an unpopulated center. The rolling pattern is similar to that observed by biologists, and includes a takeoff zone, a landing zone, and a stationary zone where grounded locusts can rest and feed. To further understand this structure, we formulate a one-dimensional continuum problem describing a vertical slice of the swarm. Using variational methods, we derive a Fredholm integral equation for locust density and find exact solutions which agree closely with simulations of the discrete problem. (Received February 15, 2010)