Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Automated detection and analysis of key transitions in biofilm formation TRAVIS THATCHER, BENJAMIN COOLEY, VERNITA GORDON, Center for Nonlinear Dynamics and Department of Physics, University of Texas at Austin — Biofilms are cooperative, dynamic, multicellular systems made of interacting, surface-bound bacteria and/or yeast. The growth of biofilms is an inherently developmental process, characterized by changes in gene expression in response to cues from the environment and other cells. These changes in gene expression are associated with transitions in the behavior of bacteria in the developing biofilm. There are other transitions in behavior that may result from nongenetic influences, such as the conditioning of the surface with bacteria-produced extracellular materials. The early development of biofilms show several key transitions as bacteria move from discrete, swimming cells into surface-bound, dense microcolonies. Each of these transitions is associated with a loss of entropy and, therefore, must result from biological activity that compensates for this loss of entropy. We present a set of approaches for automatically identifying each of these transitions and localizing them in space and time.

Travis Thatcher
Center for Nonlinear Dynamics and Dept of Physics,
University of Texas at Austin

Date submitted: 27 Nov 2010 Electronic form version 1.4