Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

A model for Entropy Production, Entropy Decrease and Action Minimization in Self-Organization GEORGI GEORGIEV, Assumption College and Worcester Polytechnic Institute, ATANU CHATTERJEE, Worcester Polytechnic Institute, THANH VU, Assumption College, GERMANO IANNACCHIONE, Worcester Polytechnic Institute — In self-organization energy gradients across complex systems lead to change in the structure of systems, decreasing their internal entropy to ensure the most efficient energy transport and therefore maximum entropy production in the surroundings. This approach stems from fundamental variational principles in physics, such as the principle of least action. It is coupled to the total energy flowing through a system, which leads to increase the action efficiency. We compare energy transport through a fluid cell which has random motion of its molecules, and a cell which can form convection cells. We examine the signs of change of entropy, and the action needed for the motion inside those systems. The system in which convective motion occurs, reduces the time for energy transmission, compared to random motion. For more complex systems, those convection cells form a network of transport channels, for the purpose of obeying the equations of motion in this geometry. Those transport networks are an essential feature of complex systems in biology, ecology, economy and society.

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Date submitted: 01 Dec 2016 Electronic form version 1.4