

Abstract Submitted
for the 4CF15 Meeting of
The American Physical Society

Searching for Minimal Mechanisms that can Achieve Biological Adaptation MERRILL ASP, MARK TRANSTRUM, Brigham Young University — Adaptation is an important biological function that can be achieved through networks of enzyme reactions. These networks can be modeled as systems of coupled differential equations. There has been recent interest in identifying mechanisms that achieve adaptation. We ask what design principles are necessary for a network to adapt to an external stimulus. We use a novel approach that begins with a fully connected network and uses model reduction to remove unnecessary combinations of components, effectively constructing and tuning the network to the simplest form that still can achieve adaptation. We show that our approach can effectively identify the basic design principles behind adaptation, and we discuss the prospects of identifying similar principles for other behaviors and contexts.

Mark Transtrum
Brigham Young University

Date submitted: 10 Sep 2015

Electronic form version 1.4