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**Attractor Distribution in Random Biological Networks Described by ODEs and Diminished Order-Chaos Transition** ZHIYUAN LI, UCSF, Dept of Biophysics, CHAO TANG, UCSF — Ordinary Differential Equations (ODEs) are widely used to model biological network in a continuous manner. The state of an ODE system after infinitely long time is called attractor, which indicates the ultimate fate of the corresponding biological system. Even though the attractor behaviors of many biological systems have been understood, yet the distribution of attractors for networks followings biological reaction rules is in general unknown. In our work, we study the final state for all 3 nodes networks that follow transcriptional regulation or enzymatic reaction rules, under random parameter sets. Surprisingly, mono-stable behavior appears most frequently, while bi-stable and tri-stable behavior is less frequently observed. Oscillations are rarely seen, and chaos is almost never observed. We extend the study to random networks with a large number of nodes, and the outcome does not change qualitatively. Furthermore, with increased connectivity, the transition from order to chaos predicted by discrete models is not observed. Our results provide a null-distribution for attractors in bio-networks, and have important implication for cell fate decision.

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