Transient Dynamical Indicators of Critical Transitions

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Abstract

Replace the text here with your abstract.

Keywords: tipping point, critical transition, critical slowing down, early warning signals, resilience, intensity of attraction

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1 Introduction

A tipping point or critical transition occurs in a dynamical system when a small perturbation of conditions causes an abrupt qualitative shift in overall system behavior. This informal concept is often understood as a local bifurcation, but may also correspond to a variety of other dynamical behaviors such as global bifurcations, perturbations pushing a state variable across the boundary between two basins of attraction, or rate-induced tipping.

Critical transitions have been studied in empirical contexts ranging from Earth's climate [1] to ecological systems [2] to emerging infectious disease [3].

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In complex empirical systems, the conditions under which a critical transition occurs are generally extremely difficult to predict. In many cases, the underlying mechanisms driving such a system toward the brink may be impossible to fully understand or identify.

2 Resilience Quantification

2.1 Asymptotic Resilience

2.2 Width of Basin of Attraction

2.3 Reactivity

2.4 Intensity of Attraction

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3.1 Local Bifurcation

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3.3 Early Warning Signals

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5 Thesis Proposal

5.1 Continuity of Intensity of Attraction

5.2 Intensity through Critical Transitions

5.3 Further Possibilities

References

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