siam news

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RESEARCH

Data-driven Discovery of Governing Physical Laws

The plummeting cost of sensors, computational power, and data storage has enabled the emergence of data methods for the sciences. Such vast quantities of data offer new opportunities for data-driven discovery in various disciplines. One such area is planetary motion and gravitation, as Steven Brunton, J. Nathan Kutz, and Joshua Proctor illustrate in this article. Indeed Johannes Kepler was an early big data scientist. With access to the best and most well-guarded astronomical data at the time, he laid the foundations for the laws of planetary motion, positing the elliptical nature of planetary orbits.

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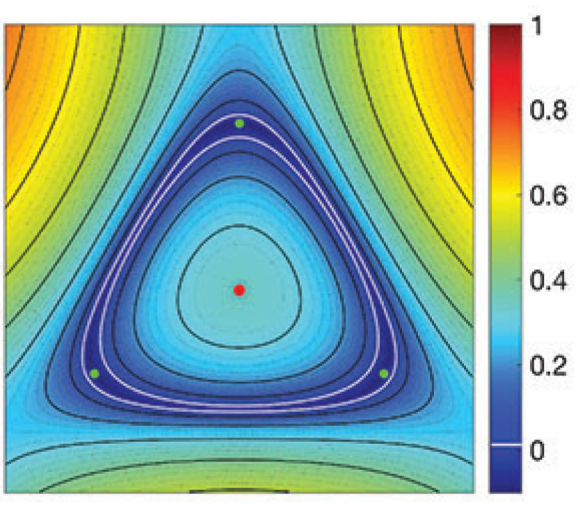

Advantage of Diversity: Consensus Because of (not Despite) Differences

It is a common presumption that individual entities are more likely to exhibit the same behavior if they are equal to each other, such as, animals using the same gait, lasers pulsing together, birds singing the same notes, and agents reaching consensus. In this article, Takashi Nishikawa and Adilson Motter challenge this notion based on their recent study, which demonstrates that this assumption is false for networks of coupled entities. The underlying behavior is an instance of a new network phenomenon they call asymmetry-induced symmetry, in which the state of the system can be symmetric only when the system itself is not.

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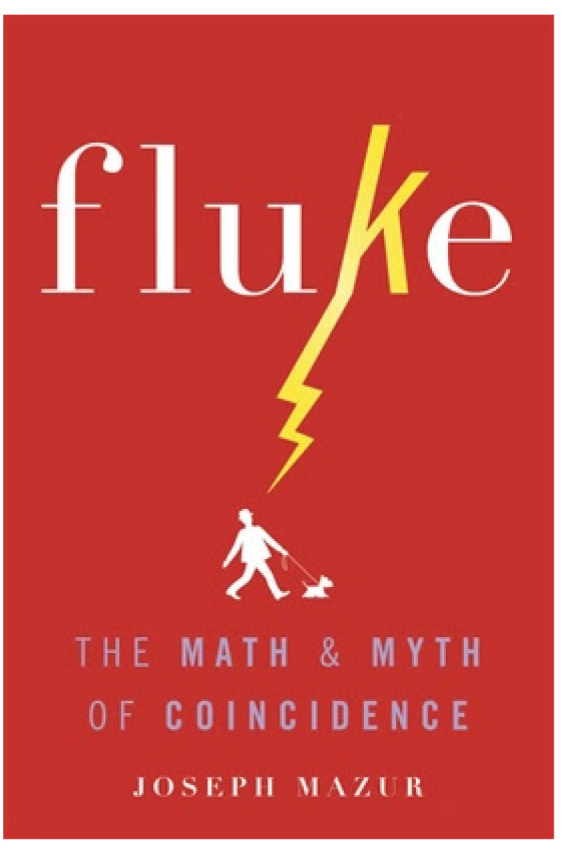
BOOK REVIEWS



What are the Odds?

James Case discusses three main types of "seemingly unlikely events"—coincidences, flukes, and serendipities—as outlined in Joseph Mazur's "Fluke: The Math and Myth of Coincidence".

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CAREERS IN THE MATHEMATICAL SCIENCES

Systems Analysis to Inform and Support Global Transformations

Stephen Robinson, Elena Rovenskaya, and Ulf Dieckmann describe the growing area of systems analysis, which yields multidisciplinary solutions and policy recommendations in response to emerging global problems.

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SOFTWARE & PROGRAMMING

Extensibility in PETSc

Matthew Knepley, Dave May, Jed Brown, and Barry Smith describe various uses for the Portable Extensible Toolkit for Scientific computation library. They show that designing and refactoring software using best practices for extensible library development enhances the software's usability, productivity, and capability.

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Sixteenth International Conference on Numerical Combustion (NC17)

April 27-April 29, 2017
SIAM International Conference on Data Mining (SDM17)

May 21-25, 2017
SIAM Conference on Applications of Dynamical Systems (DS17)

May 22-25, 2017
SIAM Conference on Optimization (OP17)

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