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The Onsager Matrix Reloaded: Teaching Nonequilibrium Statistical Mechanics via Modern Applications
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Traditional texts and courses on nonequilibrium statistical mechanics (NESM) focus on fundamentals and outmoded examples that do not reflect the explosion of applications and developments from recent decades. With the burgeoning interest in multidisciplinary approaches to key problems in science and technology, in which physics and quantitative methods play a central role, NESM emerges as one of the unifying and pivotal techniques that physicists have to offer. I outline an approach to teaching NESM that emphasizes less formal theory and more modern applications, centered around developments in (e.g.) pattern formation, materials science, biology, fluid dynamics and atmospheric science.