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Sinopsis

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Universal scaling behavior is an attractive feature in statistical physics because a wide range of models can be classified purely in terms of their collective behavior due to a diverging correlation length. This book provides a comprehensive overview of dynamical universality classes occurring in nonequilibrium systems defined on regular lattices. The factors determining these diverse universality classes have yet to be fully understood, but the book attempts to summarize our present knowledge, taking them into account systematically.
The book helps the reader to navigate in the zoo of basic models and classes that were investigated in the past decades, using field theoretical formalism and topological diagrams of phase spaces. Based on a review in Rev. Mod. Phys. by the author, it incorporates surface growth classes, classes of spin models, percolation and multi-component system classes as well as damage spreading transitions. (The success of that review can be quantified by the more than one hundred independent citations of that paper since 2004.)

The extensions in this book include new topics like local scale invariance, tricritical points, phase space topologies, nonperturbative renormalization group results and disordered systems that are discussed in more detail. This book also aims to be more pedagogical, providing more background and derivation of results. Topological phase space diagrams introduced by Kamenev (Physical Review E 2006) very recently are used as a guide for one-component, reaction-diffusion systems.