



Local Activity Principle: The Cause of Complexity and Symmetry Breaking

Klaus Mainzer, Leon Chua

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The principle of local activity explains the emergence of complex patterns in a homogeneous medium. At first defined in the theory of nonlinear electronic circuits in a mathematically rigorous way, it can be generalized and proven at least for the class of nonlinear reaction—diffusion systems in physics, chemistry, biology, and brain research. Recently, it was realized by memristors for nanoelectronic device applications. In general, the emergence of complex patterns and structures is explained by symmetry breaking in homogeneous media, which is caused by local activity. This book argues that the principle of local activity is really fundamental in science, and can even be identified in quantum cosmology as symmetry breaking of local gauge symmetries generating the complexity of matter and forces in our universe. Applications are considered in economic, financial, and social systems with the emergence of equilibrium states, symmetry breaking at critical points of phase transitions and risky acting at the edge of chaos.

Contents:

- The Local Activity Principle and the Emergence of Complexity
- Local Activity and Edge of Chaos in Computer Visualization
- The Local Activity Principle and the Expansion of the Universe
- The Local Activity Principle and the Dynamics of Matter
- The Local Activity Principle and the Evolution of Life
- The Local Activity Principle and the Co-evolution of Technology
- The Local Activity Principle and Innovation in the Economy and Society
- The Message of the Local Activity Principle

Readership: Graduates and readers interested in the fields of natural, computer, social and economic sciences, and philosophy.



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