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Alternatives to Monte Carlo Simulations for Fractal Diffusion Models

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A novel computational approach is introduced as a robust alternative to Monte Carlo simulations for diffusive processes over fractal sets. Unlike stochastic methods, introduced constrained convolution schema (CCS) is a deterministic numerical algorithm tailored for grid-based set models, including random sets, ensuring reproducibility and computational efficiency. CCS is designed to yield the complete distribution of diffusion processes within a specified timeframe, offering comprehensive insights into the dynamics of diffusion phenomena. This contribution not only outlines the theoretical framework of CCS but also provides illustrative examples demonstrating its applicability across a diverse range of fractal sets. Through its deterministic nature and versatility, CCS emerges as a valuable tool for exploring diffusion phenomena in complex systems with enhanced precision and computational tractability.

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