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## Stochastic Thresholds and Sensitivity Analysis in a General Incidence Epidemic Model with Jump Perturbations

### Communication Info

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- (1) Stochastic model
- (2) Immigration
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- (4) Extinction
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### Abstract

This study is devoted to the stochastic generalization of a deterministic epidemic framework incorporating vaccination, while accounting for environmental fluctuations modeled by both Gaussian white noise and Lévy jump processes. We first establish the biological feasibility of the system by proving the global existence of solutions, as well as their positivity and ultimate boundedness. Next, we identify sufficient criteria for disease eradication through the introduction of a stochastic threshold quantity and conduct a sensitivity analysis to assess the relative impact of key model parameters. Finally, numerical experiments are provided to support and illustrate the analytical findings.

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