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Numerical Solutions of an Option Pricing Rainfall Derivatives Model

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Abstract : Weather derivatives are financial products used to cover non catastrophic weather events with a weather index as the underlying asset. The rainfall weather derivative pricing model is modeled based in the assumption that the rainfall dynamics follows Ornstein-Uhlenbeck process, and the partial differential equation approach is used to derive the convection-diffusion two dimensional time dependent partial differential equation, where the spatial variables are the rainfall index and rainfall depth. To compute the approximation solutions of the partial differential equation, the appropriate boundary conditions are suggested, and an explicit numerical method is proposed in order to deal efficiently with the different choices of the coefficients involved in the equation. Being an explicit numerical method, it will be conditionally stable, then the stability region of the numerical method and the order of convergence are discussed. The model is tested for real precipitation data.

Keywords : finite differences method, ornstein-uhlenbeck process, partial differential equations approach, rainfall derivatives
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