

ADAPTIVE, HIGH-ORDER METHODS TO PRICE OPTIONS

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We will present numerical option pricing with the use of finite differences. For option pricing problems where the option depends on several underlying assets (eg stocks) a high-dimensional PDE has to be solved. Due to this high-dimensionality standard methods will suffer from the “curse of dimensionality”. To mitigate this curse we use adaptive techniques based on estimates of truncation errors. Hence, we place grid-points where they are most needed for accuracy reasons. In some cases we combine the adaptivity with high-order methods. We will show examples from both European options as well as options of American type. The latter type of options can be exercised at any time prior to the expiration date leading to an open boundary problem.

The whole procedure from discretization to the numerical solution of the linear system of equations that has to be solved each time-step will be presented.