On a Tikhonov Type Regularization Method for Local Volatility Model in American Option

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Abstract

We propose a convex regularization framework for the local volatility surface identification problem in American Option. This is a highly nonlinear ill-posed problem which in practice is subject to different noise levels and therefore should be regularized. We analyze, in appropriate function spaces, different properties of the parameter-to-solution map that assigns to a given volatility surface the corresponding option prices. Using such properties, we show stability and convergence of the regularized solutions in terms of the Bregman distance with respect to a class of convex regularization functionals when the noise level goes to zero.

Keyword: Local volatility surface identification, convex regularization, convergence analysis and rates, American Options

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