

The Heston stochastic volatility model has a boundary trace at zero volatility

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SUMMARY

We establish boundary regularity results in Hölder spaces for the degenerate parabolic problem obtained from the Heston stochastic volatility model in Mathematical Finance set up in the spatial domain (upper half-plane) $\mathbb{H} = \mathbb{R} \times (0, \infty) \subset \mathbb{R}^2$. Starting with nonsmooth initial data $u_0 \in H$, we take advantage of smoothing properties of the parabolic semigroup $e^{-t\mathcal{A}}: H \rightarrow H$, $t \in \mathbb{R}_+$, generated by the Heston model, to derive the smoothness of the solution $u(t) = e^{-t\mathcal{A}}u_0$ for all $t > 0$. The existence and uniqueness of a weak solution is obtained in a weighted Hilbert space $H = L^2(\mathbb{H}; \mathfrak{w})$.

Keywords: first word, second word, third word,...

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