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"Viscosity solution to elliptic path dependent PDEs"

Abstract: Motivated by questions arising in financial mathematics, Dupire introduced a notion of smoothness for functionals of paths. Based on this notion, he and other authors managed to develop a generalization of Itô's stochastic calculus. Inspired by the latter works, Ekren, Zhang and Touzi gave a definition of viscosity solutions to parabolic path dependent PDEs ensuring the well-posedness of the problem with terminal condition:

$$-\partial_t u - G(t, \omega, \partial_\omega u, \partial^2_{\omega\omega} u) = 0, \ u_T = \xi.$$

The above setting could be a powerful tool for treating non-markovian models. Our work aims to simplify and improve the uniqueness result of Ekren, Zhang and Touzi. The new approach is inspired by Jensen's regularisation in the classic theory of the viscosity solutions to PDEs.