Numerical simulation of BSDEs with drivers of quadratic growth with respect to z

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In this talk, we are concerned with a forward backward system

$$\begin{aligned} X_t &= x + \int_0^t b(s, X_s)ds + \int_0^t \sigma(s)dW_s, \\ Y_t &= g(X_T) + \int_t^T f(s, X_s, Y_s, Z_s)ds - \int_t^T Z_s dW_s, \end{aligned}$$

where g is bounded, f is locally Lipschitz and has a quadratic growth with respect to z. We first show the time dependent estimate

$$|Z_t| \leqslant M_1 + \frac{M_2}{(T-t)^{1/2}}, \quad 0 \leqslant t < T, \tag{1}$$

by fitting the proof of [1]. Then, thanks to this estimate, we obtain a convergence speed for a modified time discretization scheme for our quadratic BSDE by modifying the classical uniform time net : the idea is to put more discretization points near the final time T than near 0. To be more precise, if we suppose that g is α-Hölder then we show that the error is of order $n^{-(\alpha-\eta)}$ where n is the number of time discretization points and η is any positive parameter.

Références

[1] F. Delbaen, Y. Hu, and X. Bao. Backward SDEs with superquadratic growth. arXiv :0902.3316v1, 2009.