Approximation of Backward Stochastic Differential Equations Driven by Lévy Noise

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We consider a discrete-time approximation $(Y_s^n, Z_{s,\cdot}^n)_{s\in[0,1]}$ of the solution $(Y_s, Z_{s,\cdot})_{s\in[0,1]}$ to the backward stochastic differential equation

$$
\begin{aligned}
Y_t &= H + \int_t^1 f\Big(s, Y_s, \int_{\mathbb{R}} Z_{s,x}\mu(dx)\Big)ds - \sigma \int_{(t,1]} Z_{s,0} dW_s \\
&\quad - \int_{(t,1]\times\mathbb{R}} Z_{s,x}\, x\tilde{N}(dt,dx), \quad 0 \le t \le 1.
\end{aligned}
$$

Here W denotes the Brownian motion and $\tilde{N}$ stands for the compensated Poisson random measure. We assume that the generator $f(s,y,z)$ is Lipschitz. We investigate conditions on the chaos expansion of the terminal condition H which are sufficient to have the convergence rate

$$
\sup_{t\in[0,1]} \mathbb{E}|Y_t - Y_t^n|^2 + \int_{[0,1]\times\mathbb{R}} \mathbb{E}|Z_{s,x} - Z_{s,x}^n|^2 ds\mu(dx) \le cn^{-1}.
$$