

DISCRETE APPROXIMATIONS OF GENERALIZED RBSDE WITH RANDOM TERMINAL TIME

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Abstract

The convergence of discrete approximations of generalized reflected backward stochastic differential equations with random terminal time in a general convex domain is studied. Applications to investigation obstacle elliptic problem with Neumann boundary condition for partial differential equations are given.

Keywords: generalized reflected BSDE, discrete approximation methods, viscosity solution.

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REFERENCES

- [1] V. Bally, *Approximation scheme for solutions of BSDE*, Pitman Res. Notes Math. Ser. 364 Longman Harlow (1997) 177–191.
- [2] V. Bally and G. Pages, *Error analysis of the optimal quantization algorithm for obstacle problems*, Stochastic Process. Appl. **106** (1) (2003) 1–40.
doi:10.1016/S0304-4149(03)00026-7
- [3] P. Briand, B. Delyon and J. Mémin, *Donsker-Type theorem for BSDEs*, Elect. Comm. in Probab. **6** (2001) 1–14.
- [4] P. Briand, B. Delyon and J. Mémin, *On the robustness of backward stochastic differential equations*, Stochastic Process. Appl. **97** (2002) 229–253.
doi:10.1016/S0304-4149(01)00131-4

- [5] A. Gegout-Petit and É. Pardoux, *Equations différentielles stochastiques rétrogrades réfléchies dans un convexe*, Stoch. Stoch. Rep. **57** (1996) 111–128.
- [6] K. Jańczak, *Discrete approximations of reflected backward stochastic differential equations with random terminal time*, Probab. Math. Statistics **28** (2008) 41–74.
- [7] K. Jańczak, *Generalized reflected backward stochastic differential equations*, Stochastics **81** (2009) 147–170.
doi:10.1080/17442500802299007
- [8] K. Jańczak-Borkowska, *Generalized RBSDE with random terminal time*, Bull. Polish Acad. Sci. Math. **59** (2011) 85–100.
doi:10.4064/ba59-1-10
- [9] P.L. Lions and A.S. Sznitman, *Stochastic differential equations with reflecting boundary conditions*, Comm. Pure Appl. Math. (1984) 511–537.
- [10] J. Ma, P. Protter, J. San Martin and S. Torres, *Numerical method for backward stochastic differential equations*, Ann. Appl. Probab. **12** (2002) 302–316.
doi:10.1214/aoap/1015961165
- [11] J. Ma and J. Zhang, *Representation and regularities for solutions to BSDEs with reflections*, Stochastic Process. Appl. **115** (2005) 539–569.
doi:10.1016/j.spa.2004.05.010
- [12] J.L. Menaldi, *Stochastic variational inequality for reflected diffusion*, Indiana Univ. Math. Journal **32** (1983) 733–744.
doi:10.1512/iumj.1983.32.32048
- [13] É. Pardoux and S. Peng, *Adapted solutions of a backward stochastic differential equation*, Systems Control Lett. **14** (1990) 55–61.
doi:10.1016/0167-6911(90)90082-6
- [14] É. Pardoux and A. Răşcanu, *Backward stochastic differential equations with subdifferential operator and related variational inequalities*, Stochastic Process. Appl. **76** (1998) 191–215.
doi:10.1016/S0304-4149(98)00030-1
- [15] É. Pardoux and S. Zhang, *Generalized BSDEs and nonlinear Neumann boundary value problems*, Probab. Theory Relat. Fields **110** (1998) 535–558.
doi:10.1007/s004400050158

- [16] Y. Ren and N. Xia, *Generalized reflected BSDE and an obstacle problem for PDEs with a nonlinear Neumann boundary condition*, Stochastic Analysis and Applications **24** (2006) 1–21.
doi:10.1080/07362990600870454
- [17] L. Słomiński, *Euler's approximations of solutions of SDE's with reflecting boundary*, Stochastic Process. Appl. **94** (2001) 317–337.
doi:10.1016/S0304-4149(01)00087-4
- [18] S. Toldo, *Stability of solutions of BSDEs with random terminal time*, SAIM Probab. Stat. **10** (2006) 141–163.
doi:10.1051/ps:2006006

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