

**Deng, Liubao; Chen, Yuefen**

**Optimal control of uncertain systems with jump under optimistic value criterion.** (English)

Zbl 1380.49030

Eur. J. Control 38, 7-15 (2017).

Summary: Based on uncertainty theory, a new optimistic value model of uncertain optimal control for uncertain dynamic systems with jump is established. The principle of optimality is proposed and the equation of optimality is obtained for presented model by employing the dynamic programming method. As an application, an optimal control problem of pension fund is discussed to verify the validity of the proposed method.

**MSC:**

49L20 Dynamic programming in optimal control and differential games

93C41 Control/observation systems with incomplete information

49K99 Optimality conditions

90C39 Dynamic programming

Cited in 2 Documents

**Keywords:**

optimal control; uncertainty; optimistic value; jump; pension fund

**Full Text:** [DOI](#)

**References:**

- [1] Boulier, J.; Michel, S.; Wisnia, V., Optimizing investment and contribution policies of a defined benefit pension fund, Proceedings of the Sixth AFIR International Colloquium, 1, 593-607, (1996)
- [2] Boulier, J.; Trussant, E.; Florens, D., A dynamic model for pension funds management, Proceedings of the Fifth AFIR International Colloquium, 1, 361-384, (1995)
- [3] Cairns, A., Some notes on the dynamics and optimal control of stochastic pension fund models in continuous time, Astin Bull., 30, 1, 19-55, (2000) · [Zbl 1018.91028](#)
- [4] Chen, R.; Zhu, Y. G., An optimal control model for uncertain systems with time-delay, J. Oper. Res. Soc. Jpn., 54, 4, 243-256, (2013) · [Zbl 1295.49019](#)
- [5] Deng, L. B.; Zhu, Y. G., An uncertain optimal control model with  $\{n\}$  jumps and application, Comput. Sci. Inf. Syst., 9, 4, 1453-1468, (2012)
- [6] Deng, L. B.; Zhu, Y. G., Uncertain optimal control with jump, ICIC Express Lett. Part B Appl., 3, 2, 419-424, (2012)
- [7] Deng, L. B.; Zhu, Y. G., Uncertain optimal control of linear quadratic models with jump, Math. Comput. Model., 57, 9-10, 2432-2441, (2013) · [Zbl 1286.93202](#)
- [8] Gao, W.; Xu, C., Optimal portfolio selection when stock prices follow a jump-diffusion process, Math. Methods Oper. Res., 60, 3, 485-496, (2004) · [Zbl 1123.91026](#)
- [9] Hanson, F.; Tuckwell, H., Population growth with randomly distributed jumps, J. Math. Biol., 36, 169-187, (1997) · [Zbl 0891.92022](#)
- [10] Kang, Y. J.; Zhu, Y. G., Bang-bang optimal control for multi-stage uncertain systems, Inf. Int. Interdiscip. J., 15, 8, 3229-3238, (2012) · [Zbl 1323.49014](#)
- [11] Liu, B. D., Uncertainty Theory, (2007), Springer-Verlag Berlin
- [12] Liu, B. D., Fuzzy process, hybrid process and uncertain process, J. Uncertain Syst., 2, 3-16, (2008)
- [13] Liu, B. D., Some research problems in uncertainty theory, J. Uncertain Syst., 3, 1, 3-10, (2009)
- [14] Liu, B. D., Theory and Practice of Uncertain Programming, (2009), Springer-Verlag Berlin
- [15] Liu, B. D., Uncertainty Theory: A Branch of Mathematics for Modeling Human Uncertainty, (2010), Springer-Verlag Berlin
- [16] Merton, R., Optimal consumption and portfolio rules in a continuous time model, J. Econ. Theory, 3, 373-413, (1971) · [Zbl 1011.91502](#)
- [17] Ngwira, B.; Gerrard, R., Stochastic pension fund control in the presence of Poisson jumps, Insur. Math. Econ., 40, 283-292, (2007) · [Zbl 1120.60063](#)
- [18] Rishel, R., A minimum principle for controlled jump processes, Lecture Notes in Economics and Mathematical Systems, 107, 493-508, (1975)
- [19] Sheng, L. X.; Zhu, Y. G., Optimistic value model of uncertain optimal control, Int. J. Uncertain. Fuzziness Knowl.-Based

- Syst., 21, Suppl. 1, 75-87, (2013) · [Zbl 1322.93064](#)
- [20] Wu, Z.; Yu, Z. Y., Linear quadratic nonzero-sum differential games with random jumps, *Appl. Math. Mech.*, 26, 8, 1034-1039, (2005) · [Zbl 1144.91305](#)
- [21] Xu, X. X.; Zhu, Y. G., Uncertain bang-bang control for continuous time model, *Cybern. Syst. Int. J.*, 43, 6, 515-527, (2012) · [Zbl 1331.93228](#)
- [22] Yan, H. Y.; Zhu, Y. G., Bang-bang control model for uncertain switched systems, *Appl. Math. Model.*, 39, 10-11, 2994-3002, (2015)
- [23] Yang, H.; Zhang, L., Optimal investment for insurer with jump-diffusion risk process, *Insur. Math. Econ.*, 37, 615-634, (2005) · [Zbl 1129.91020](#)
- [24] Yao, K.; Qin, Z. F., An uncertain control model with application to production inventory system, *Proceedings of the Twelfth Asia Pacific Industrial Engineering and Management Systems Conference*, 972-977, (2011)
- [25] Zhu, Y. G., Uncertain optimal control with application to a portfolio selection model, *Cybern. Syst.*, 41, 7, 535-547, (2010) · [Zbl 1225.93121](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.