# BURKHOLDER–DAVIS–GUNDY INEQUALITY FOR $g$–MARTINGALES

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*Abstract.* In this study, we establish a Burkholder-Davis-Gundy (BDG) inequality type for certain nonlinear martingales arising from backward stochastic differential equations (BSDE) with generalized Lipschitz generator. As a consequence, we attempt to prove the equivalence between the convergence in probability of a $g$-martingale sequence and the associated quadratic variation sequence. Using a counterexample, we prove that BDG fails when g is quadratic.

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## REFERENCES

[1] Z. CHEN AND B. WANG, *Infinite time interval BSDEs and the convergence of g-martingales*, Journal of the Australian Mathematical Society Series A Pure Mathematics and Statistics, **69**, 2 (2000), 187–211.

[2] S. FAN, L. JIANG AND D. TIAN, *One-dimensional BSDEs with finite and infinite time horizons*, Stochastic Processes and their Applications, **121**, 3 (2011), 427–440.

[3] E. LENGLART, *Relation de domination entre deux processus*, Annales de l'I.H.P. Probabilités et statistiques, **13**, 2 (1977), 171–179.

[4] E. PARDOUX, S. G. PENG, *Adapted solution of a backward stochastic differential equation*, Systems & Control Letters, **14**, 1 (1990), 55–61.

[5] S. PENG, *Backward SDE and related g-expectations*, In Backward Stochastic Differential Equations; El Karoui, N., and Mazliak, L., Eds. Pitman Research Notes in Mathematics Series, **364**, (1997), 141–159, Longman Scientific & Technical.

[6] D. REVUZ AND M. YOR, *Continuous Martingales and Brownian Motion*, Third Edition, Springer-Verlag, Berlin, Heldelberg, New York (1999).

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